APPENDICES

APPENDIX A

CONCORDANCE TABLES

Baffinland

Concordance Table - Type A Water Licence 2AM -MRY1325			
Type A 2AM-MRY 1325		**2016 QIA and NWB Annual Report for Operations**	
Condition No.	**Condition**	**Report Reference/Response**	
Schedule B. General Conditions ***The Annual Report referred to in Part B, Item 4 shall include:***			
1	The Licensee shall file with the Board, no later than March 31st of the year following the calendar year being reported, an Annual Report on the appurtenant undertaking which shall contain the following information:	See below	Annual Report submitted on March 31, 2017.
a.	**WATER**		
i.	The monthly and annual volumes, in cubic meters, of all fresh Water withdrawn for domestic and industrial purposes and for dust suppression associated with the Early Revenue Phase, from each source in, on, or flowing through Inuit-owned land in accordance with Part E, Items 3, 4 and 25 of the License;	Section 2..0 Table 2.1 Table 2.2	Water Use and Waste Disposal Activities Daily, Monthly and Annual Quantities of Water Used for Project Sites on Inuit-Owned Land and Crown Land Daily and Annual Quantities of Water Used for Dust Suppression
ii	The monthly and annual volumes, in cubic meters, of all freshwater obtained for domestic and industrial purposes and for dust suppression associated with the Early Revenue Phase, from each source in, on, or flowing through Crown Lands in accordance with Part E, Items 3, 4 and 25 of the Licence;	Section 2..0 Table 2.1 Table 2.2	Water Use and Waste Disposal Activities Daily, Monthly and Annual Quantities of Water Used for Project Sites on Inuit-Owned Land and Crown Land Daily and Annual Quantities of Water Used for Dust Suppression
iii	The combined monthly and annual volumes in cubic meters of all fresh Water withdrawn for domestic and industrial purposes and for dust suppression associated with the Early Revenue Phase, from sources in, on, or flowing through both Inuit-Owned Land and Crown Lands	Section 2..0 Table 2.1 Table 2.2	Water Use and Waste Disposal Activities Daily, Monthly and Annual Quantities of Water Used for Project Sites on Inuit-Owned Land and Crown Land Daily and Annual Quantities of Water Used for Dust Suppression
iv	The monthly and annual volumes of reclaimed or recycled Water used and the purposes for which it is used;	Section 2.1.2 Table 2.2	Reclaimed and Recycled Water Daily and Annual Quantities of Water Used for Dust Suppression
b	**WASTE**		
i	The monthly and annual volume in cubic meters of treated Sewage effluent discharged from each Sewage Treatment Facility including each Polishing Waste Stabilization Pond;	Section 2.2.1 Table 2.5	Quantity of Treated Sewage Effluent and Sludge from WWTF and PWSPs Monthly and Annual Quantities of Treated Sewage Effluent and Sludge Removed
ii	The monthly and annual volume in cubic meters of treated wastewater discharged from each Oily Water/Wastewater Treatment Facility;	Section 2.2.2 Table 2.3	Quantity of Treated Wastewater from Oily Water Treatment Facility Monthly and Annual Quantities of Treated Oily Water Effluent
iii	The monthly and annual volume in cubic meters of any wastes backhauled to communities in Nunavut for treatment	Section 2.2.3 Table 2.4	Quantity of Effluent from Surface Water Management Ponds Monthly and Annual Quantities of Effluent Discharged from Ore and Waste Rock Stockpile Sedimentation Ponds
iv	The monthly and annual volumes in cubic metres of Sludge removed from each Sewage Treatment Facility and disposed of at each Landfill Facility or any approved alternative disposal facility	Table 2.5	Monthly and Annual Quantities of Treated Sewage Effluent and Sludge Removed
v	The monthly and annual volume in cubic meters of hazardous waste generated and transported from the Project sites to Licensed facility outside of Nunavut for treatment	Section 2.2.4 Appendix D.1 Appendix D.4	Solid Non-Hazardous and Hazardous Waste Management Waste Management Program 2016 Shipping Manifests (Inbound and Outbound)
vi	The monthly and annual volume in cubic meters of any wastes backhauled to communities in Nunavut for treatment	N/A	No wastes were backhauled to communities in Nunavut for treatment in 2016.

Baffinland

Concordance Table - Type A Water Licence 2AM -MRY1325

Type A 2AM-MRY 1325		2016 QIA and NWB Annual Report for Operations	
Condition No.	**Condition**	**Report Reference/Response**	
vii	The monthly and annual volume in cubic meters of waste deposited at each Landfill Facility	Section 2.2.4 Table 2.7	Solid Non-Hazardous and Hazardous Waste Management Monthly and Annual Quantities of Waste Disposed in Non-Hazardous Landfill Facility
	Monthly and annual volume in cubic metres of hydrocarbon impacted soil and water deposited at each Landfarm Facility	Table 2.8	Monthly and Annual Quantities of Hydrocarbon Impacted Soil, Water and Snow Disposed at Landfarm Facility
ix	The monthly and annual volume in cubic metres of Sewage transported for treatment from the Railway camps to the Mine Site and Steensby Port Site Sewage Treatment Facilities	N/A	No railway camps were used in 2016.
x	The monthly and annual quantities of waste rock generated and used or disposed of	Table 2.9	Monthly and Annual Quantities of Waste Rock Generated and Used or Disposed Of - Deposit No. 1
xi	Summary of quantities and analysis of seepage and runoff monitoring from the Landfill Facilities, Landfarm facilities, and any other relevant facilities including ponds embankment dam	Section 2.2 Section 5.0 Table 5.2	Sewage, Waste and Greywater Management Monitoring Water Quality Results for Water Licence Monitoring Locations
xii	A summary report of solid waste disposal activities including monthly and annual quantities in cubic metres of waste generated and location of disposal	Section 2.2.4 Table 2.6 Table 2.7 Appendix D.1	Solid Non-Hazardous and Hazardous Waste Management Location of Temporary and Permanent Storage Areas for Waste Monthly and Annual Quantities of Waste Disposed in Non-Hazardous Landfill Facility Waste Management Program 2016
c	**SPILLS**		
i	A list and description of all unauthorized discharges, including volumes and spill report line identification number and summaries of follow-up action taken	Section 3.0 Table 3.1	Spills Summary of Unauthorized Discharges
ii	A list of unauthorized discharges and a summary of follow-up action(s) taken	Section 3.0 Table 3.1 Appendix D.7.3 Appendix D.7.7	Spills Summary of Unauthorized Discharges FAD-LNC Biweekly Reports and Completion Report Follow-Up Spill Reports
iii	A summary of any updates or revisions to the Spill Contingency Plan	Section 7.2	Revisions of Plans, Reports and Manuals Spill Contingency Plan (BAF-PH1-830-P16-0036)

Baffinland

Concordance Table - Type A Water Licence 2AM -MRY1325			
Type A 2AM-MRY 1325		**2016 QIA and NWB Annual Report for Operations**	
Condition No.	**Condition**	**Report Reference/Response**	
d	**MODIFICATIONS**		
i	A summary of modifications and/or major maintenance work carried out on all water and waste related structures and facilities;	Section 4.0 Section 7.3	Modifications Summary of Construction Activities
e	**MONITORING**		
i	The results of monitoring under the AEMP framework and other monitoring requirements and/or any other monitoring program, regime or plan authorized by the Board in writing;	Section 5.6 Appendix D.9	Aquatic Effects Monitoring Program (AEMP) Aquatic Effects Monitoring Reports
ii	Results of thermal monitoring and/or research carried out in conjunction with the Waste Rock Management Plan and disposal of potentially acid generating and metal leaching materials, permafrost integrity along the railway alignment and other project sites;	Section 7.9 Appendix D.5	Geochemical Waste Rock Studies and Operation Testing Results Waste Rock Geochemistry Report, Data and Status Update
iii	Tabular summaries of the results and interpretation of all data generated under the Monitoring Program in Part I and Schedule I	Section 5 Table 5.1	Monitoring Water Quality Results for Water Licence Monitoring Locations
f	**CLOSURE**		
i	A summary of any progressive closure and reclamation work undertaken including photographic records of site conditions before and after completion of operations, and an outline of any work anticipated for the next year, including any changes to implementation and scheduling	Section 1.3 Section 6 Appendix C.3 Appendix D.1 Appendix D.4	Summary of Project Plans for 2017 Progressive Reclamation Work Photo Journal Waste Management Program 2016 Shipping Manifest (Inbound and Outbound)
ii	An updated estimate of the current restoration liability required under part C, Item, 1b, based upon the results of progressive restoration, restoration research, project development monitoring, and any changes or modifications to the project	Section 6.2 Appendix D.8	Current Restoration Liability 2016 Marginal Reclamation and Closure Security Estimate
g	**PLANS/REPORTS/STUDIES**		
i	A summary of any studies requested by the Board that relate to Waste disposal, Water use or Reclamation, and a brief description of any future studies planned	N/A	No studies were requested by the Board in 2016.
ii	Where applicable, revisions provided as Addendums with an indication of where changes have been made for Plans, Reports, and Manuals	Section 7.2	Revisions of Plans, Reports and Manuals
iii	An executive summary in English, Inuktitut and French of all plans, reports, or studies conducted under this Licence	Foreword	Executive Summary (English) (Inuktitut) (French)
iv	A summary, including photographic records before, during and after construction activities, of any modifications and/or major maintenance work carried out on facilities and Infrastructure designed to contain, withhold, divert or retain Water or Wastes, and an outline of any work anticipated for the next year	Section 4.0 Section 7.3 Appendix C.1 Appendix C.3	Modifications Summary of Construction Activities Construction Summary Reports Photo Journal
v	A summary of the results of any geochemical analyses conducted on materials used to construct facilities and infrastructure under Part D, Item 13	Appendix D.5 Appendix D.6	Waste Rock Geochemistry Report, Data, and Status Update Quarry Geochemistry Analytical Sampling Results

Baffinland

Concordance Table - Type A Water Licence 2AM -MRY1325			
Type A 2AM-MRY 1325		2016 QIA and NWB Annual Report for Operations	
Condition No.	**Condition**	**Report Reference/Response**	
vi	A detailed discussion on the performance, installation, and evaluation, including the use of photographic records, of the primary and secondary containment structure used in fuel storage to safeguard impacts to freshwaters	Section 7.4 Appendix C.2 Appendix C.3	Summary of Fuel Storage Geotechnical Inspections Photo Journal
vii	The results of chemical analyses conducted on residue generated from each incinerator system prior to disposing of in any landfill	Section 7.5 Appendix D.2	Results of Chemical Analysis of Incinerator Ash Incinerator Ash Testing Results 2016
viii	A brief description of follow-up action(s) taken to address concerns presented within any inspection and compliance reports prepared by the Inspector	Appendix D.7	Inspection Reports and Follow-Up Reports
ix	An update, where required under Part B, Item, 18, in the form of an addendum or revision to the Plans approved under the relevant sections of this Licence	Section 7..2	Revisions of Plans, Reports and Manuals
x	Monthly and annual quantities of aggregates excavated and used from Quarries and Borrow Pits associated with the Licence	Table 7.1 Table 7.2	Quarterly and Annual Quantities of Specified Substances Removed from Borrows and Quarries (BCM) Quantities of Specified Substances Removed from Borrows and Quarries (BCMs) for September 1, 2015 to August 31, 2016 Reporting Period
xi	The results of any further acid/base accounting conducted on potential acid generating and non-potential acid generated waste rock(PAG and NPAG)	Section 7.9 Appendix D.5	Geochemical Waste Rock Studies and Operational Testing Results Waste Rock Geochemistry Report, Data and Status Update
xii	A summary of any specific studies or reports requested by the Board, and a brief description of any future studies planned or proposed;	N/A	No studies or reports were requested by the Board in 2016.
xiii	All monitoring data with respect to geochemical analyses conducted on material used to construct roads, quarries, and other infrastructure;	Section 7.8 Appendix D.5 Appendix D.6	Summary of Geochemical Analysis for Quarries Waste Rock Geochemistry Report, Data and Status Update Quarry Geochemistry Analytical Sampling Results
xiv	The monthly and annual volume of in cubic metres of treated Effluent discharged into the marine environment from the Milne Port Ore Stockpile Sedimentation Pond.	Section 2.2.3 Table 2.4	Quantity of Effluent from Surface Water Management Ponds Monthly and Annual Quantities of Effluent Discharged from Ore and Waste Rock Stockpile Sedimentation Ponds
h	**GENERAL**		
i	A summary of actions taken to address concerns or deficiencies listed in the inspection reports and/or compliance reports filed by an Inspector	Section 7.6 Appendix D.7	Inspection and Compliance Reports Inspection Reports and Follow-up Reports
ii	A summary of public consultation and participation with local organizations and the residents of the nearby communities, including a schedule of upcoming community events and information sessions	Section 8 Table 8.1 Table 8.2	Public Consultations Meetings with Public, Government and Inuit Organizations Stakeholder Site Visits to Mary River
iii	Monthly and annual volume of iron ore generated by the project	Table 9.1	Monthly and Annual Quantity of Iron Ore Generated by the Project
i	**OTHER**		
	Any other details on Water use or Waste Disposal requested by the Board by November 1st of the year being reported.	N/A	No other details on Water use or Waste Disposal was requested by the Board by November 1, 2015

Baffinland

Concordance Table - Commercial Lease No. Q13C301			
Commercial Lease No. Q13C301		**The 2015 QIA and NWB Annual Report**	
Condition No.	**Condition**	**Report Reference**	
Annual Reporting Requirements			
Part 6.4	For informational purposes, by no later than March 31 in each Year during the Term, the Tenant shall deliver to the Landlord an Annual Report for the preceding Year which shall include the following:	See below	Annual Report submitted on March 31, 2017.
a.	A report of activities conducted relative to what was described in the Work Plan submission for the Previous Year;	Section 1.1 Section 7.3	Summary of Project Activities for 2016 Summary of Construction Activities
b.	A description of construction and infrastructure changes, additions or removals located within the boundaries of all Land Use Areas;	Section 1.1 Section 4.0 Section 7.3 Appendix C.1 Appendix C.3	Summary of Project Activities for 2016 Modifications Summary of Construction Activities Construction Summary Reports Photo Journal
c.	All "As Built" reports available, signed and stamped by an Engineer, for all works completed as per (b) above;	Appendix C.1	Construction Summary Reports
d.	Description of any and all mining and exploration activities, and the results and outcomes thereof including:	Section 1.1	Summary of Project Activities for 2016 (see sections below)
	I. exploration activity and drilling summary	N/A	Refer to *2016 QIA and NWB Annual Report for Exploration and Geotechnical Drilling Activities* submitted to QIA and NWB on March 31, 2017.
	II. amount and type of ore and waste mined in each month	Table 2.9 Table 9.1	Monthly and Annual Quantities of Waste Rock Generated and Used or Disposed of Monthly and Annual Quantities of Ore Generated by the Project
	III. amount and type of ore shipped each month	Table 9.2	Monthly and Annual Quantities of Ore Shipped by the Project
	IV. quantities of each Specified Substance including sand, gravel, construction stone, and ice, quarried each month, broken down by individual quarry site or borrow location	Table 7.1 Table 7.2	Quarterly and Annual Quantities of Specified Substances Removed from Borrow and Quarries (BCMs) Quantities of Specified Substances Removed from Borrows and Quarries (BCMs) for September 1, 2015 to August 31, 2016 Reporting Period
e.	Quantities of waste deposited in the landfill, landfarm and or other approved waste storage areas each calendar quarter	Section 2.2.4 Table 2.6 Table 2.7 Table 2.8	Solid Non-Hazardous and Hazardous Waste Management Location of Temporary and Permanent Storage Areas for Wastes Monthly and Annual Quantities of Waste Disposed in Non-Hazardous Landfill Facility Monthly and Annual Quantities of Hydrocarbon Impacted Soil, Water and Snow Disposed of at Landfarm Facility
f.	Type and quantities of materials the were shipped off the Lands	Section 6.1 Appendix D.1 Appendix D.4	Progressive Reclamation Waste Management Program 2016 Shipping Manifest (Inbound and Outbound)
g.	Type and quantities of materials that were shipped to and stored on the Lands	Section 1.1 Appendix D.4	Summary of Project Activities for 2016 Shipping Manifests (Inbound and Outbound)
h.	A detailed description of any and all Reclamation Work on the Property	Section 6.1 Appendix C.3 Appendix D.1 Appendix D.4	Progressive Reclamation Photo Journal Waste Management Program 2016 Shipping Manifests (Inbound and Outbound)

Baffinland

Concordance Table - Commercial Lease No. Q13C301			
Commercial Lease No. Q13C301		**The 2015 QIA and NWB Annual Report**	
Condition No.	**Condition**	**Report Reference**	
i.	Any and all information related to a finding of non-compliance or breach of environmental standards as discovered by any Governmental Authority	Section 7.6 Appendix D.7	Inspection and Compliance Reports Inspection Reports and Follow-Up Reports
j.	A listing and compilations of reports associated with any accident, spill, release of hazardous material in the environment, fire, emergency or loss of life	Section 3.0 Table 3.1	Spills Summary of Unauthorized Discharges
k.	Information respecting the Tenant's compliance with the terms of this Lease and any permits or licenses required in respect of its Operations on the Property, together with details of any incidents of non-compliance, the results of any inspection reports or orders prepared or issued by or fines levied by any competent regulatory authority and any remedial action relating thereto	Section 7.6 Appendix D.7	Inspection and Compliance Reports Inspection Reports and Follow-Up Reports

APPENDIX B

NWB ANNUAL REPORT FORMS

NWB Annual Report **Year being reported:** 2016

License No:	2AM-MRY1325 - Amend. No 1	**Issued Date:**	July 21, 2015
		Expiry Date:	June 10, 2025

Project Name: Mary River Project

Licensee: Baffinland Iron Mines

Mailing Address: 2275 Upper Middle Road East, Suite 300
Oakville ON, Canada L6H 0C3

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

Baffinland Iron Mines Corporation

General Background Information on the Project (*optional):

Refer to Section 1.0 of the 2016 QIA and NWB Annual Report for Operations

Licence Requirements: the licensee must provide the following information in accordance with

Part B | Select

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Refer to Section 2 and Figure 1.3 and 1.5

Water Quantity:		
	220,752 cu.m/year	Quantity Allowable Domestic (cu.m)
	Various - Refer to Table 2.1 and Table 2.2 of the Report	Actual Quantity Used Domestic (cu.m)
	-	Quantity Allowable Drilling (cu.m)
	-	Total Quantity Used Drilling (cu.m)

Waste Management and/or Disposal

- [x] Solid Waste Disposal
- [x] Sewage
- [x] Drill Waste
- [x] Greywater
- [x] Hazardous
- [ ] Other:

Additional Details:

Refer to Section 2 of the 2016 QIA and NWB Annual Report for Operations

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: See Table 3.1 (as reported to the Spill Hot-line)
Date of Spill: See Table 3.1
Date of Notification to an Inspector: See Table 3.1
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc.)

See Table 3.1, Section 3 and Appendix D.7.4 of the 2016 QIA and NWB Annual Report for Operations

Revisions to the Spill Contingency Plan

Other: (see additional details)

Additional Details:

Refer to updated Emergency Response Plan and Spill Contingency Plan

Revisions to the Abandonment and Restoration Plan

AR plan submitted and approved - no revision required or proposed

Additional Details:

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Refer to Section 6.1 of the 2016 QIA and NWB Annual Report for Operations

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Details described below

Additional Details:

Refer to Table 5.1 and Figures 1.3 to 1.7 (inclusive) of 2016 QIA and NWB Annual Report for Operations

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Details described below

Additional Details:

Refer to Table 2.6 and Figures 1.3 to 1.7 (inclusive) of 2016 QIA and NWB Annual Report for Operations

Results of any additional sampling and/or analysis that was requested by an Inspector

No additional sampling requested by an Inspector or the Board

Additional Details: (date of request, analysis of results, data attached, etc.)

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

Select

Additional Details: (Attached or provided below)

Any responses or follow-up actions on inspection/compliance reports

Select

Additional Details: (Dates of Report, Follow-up by the Licensee)

Refer to Section 7.6 and Appendix D.7 of the 2016 QIA and NWB Annual Report for Operations

Any additional comments or information for the Board to consider

The 2016 QIA and NWB Annual Report for Operations provides further details on water use and waste disposal, construction activities, geochemical analysis of core, fuel storage, unauthorized discharges, inspection and compliance report concerns, updates to plans, progressive reclamation work and consultations.

Date Submitted: March 31, 2017

Submitted/Prepared by: Andrew Vermeer

Contact Information:

Tel: (416) 364-8820 ext. 5005

Fax:

email: andrew.vermeer@baffinland.com

APPENDIX C.1

CONSTRUCTION SUMMARY REPORTS

Baffinland Iron Mines Corporation
Mary River Project

Construction Summary Report: Mine Site Waste Rock Sedimentation Pond and Drainage Ditch

REGISTERED PROFESSIONAL ENGINEER
M. J. BUYKX
LICENSEE
16FEB'17
NT/NU

2017-01-24	0	Approved for Use	M Buykx	T. Bruce	T. Bruce	~~J. Millard~~ W. McPhee
Date	Rev.	Status	Prepared By	Checked By	Approved By	Approved By
HATCH						Client

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Appendices

1. Facility Description

1.1 Purpose and Design Basis

The Mine Site waste rock sedimentation pond retains runoff water from the waste rock stockpile and allows solids suspended in the water to settle. Each summer a portable pump will be set up at the pond, and following water testing to confirm the water satisfies the discharge criteria, the water will be pumped over the pond wall in to a ditch. The ditch is 1.25km long and directs the water to a natural stream system that is non-fish bearing. The non-fish bearing stream eventually discharges to Mary River.

The pond is sized to hold water generated from the waste rock stockpile area under normal operations, based on an annual pond pump out after the freshet. The diversion ditch will receive water flows during normal pump discharge and also if the pond overflows due to exceedance of its available storage capacity.

The as built storage capacity for the empty pond is 9,200m^3 based on information provided by the Civil contractor.

1.2 Location and Base Elevations

The waste rock sedimentation pond is located between Northing N 7 916 650 and N 7 916 850, and Easting E 562 800 and E 563 200. The pond bottom elevation varies between EL. 573m and 576m. The berm top elevation is at EL. 577m.

The waste rock pond overflow ditch is located between Northing N 7916 800 and N 7 917 200, and Easting E 562 800 and E 563 800. The elevation at the bottom of the ditch varies between EL. 576.2m and 568m.

1.3 Geometry and Access

The pond is constructed with a curved berm with design side slopes not steeper than 3H:1V and the berm top width is 8.4m. The overflow weir design slopes are 5H:1V exiting the pond.

1.4 Earthworks Materials Details

The ponds bottom is built up above the elevation of the original ground and the berm is constructed with raised earthworks. The pond has been sealed with exposed HDPE liner material for storage of the runoff water and sediments.

2. Construction Activity Summary

Construction activities on the Mine Site Waste Rock Sedimentation Pond and Drainage Ditch started in September 2015 and carried on through to August 2016. Installation of the pond liner took place in May 2016.

The following summarizes the construction activities for the pond:

a. Construct berm

b. Clear original ground inside berm

c. Excavate key ditches

d. Place crushed rock over original ground inside berm

e. Install non-woven geotextile layer

f. Install HDPE geo-membrane liner

g. Backfill key trenches

h. Place riprap

The following summarizes the construction activities for the ditch:

a. Excavate trench

b. Place rip rap

QA/QC

The quality assurance and quality control (QA/QC) conducted by Layfield documents the preparation of the subgrade, installation and final inspection of the completed liner (Appendix A).

a. An inspection of the soil subgrade was conducted prior to installation of geo-membrane and a Certificate of Acceptance of Soil Subgrade Surface was signed by the project coordinator and Layfield Environmental supervisor.

b. Daily Installation Reports prepared by Layfield describe the work performed, labour on site and weather conditions each day.

c. A certificate of final inspection and acceptance was signed by Layfield and the Baffinland project coordinator.

3. Photographic Records

Figure 1: Aerial View of Waste Rock Stockpile, Pond and Ditch

Figure 2: Fill Placement for Berm Construction

Figure 3: Berm after Fill Placement

Figure 4: Liner Installation Started

Figure 5: Liner Placement

Figure 6: Liner Installation Nearing Completion

Figure 7: Seam Welding Liner

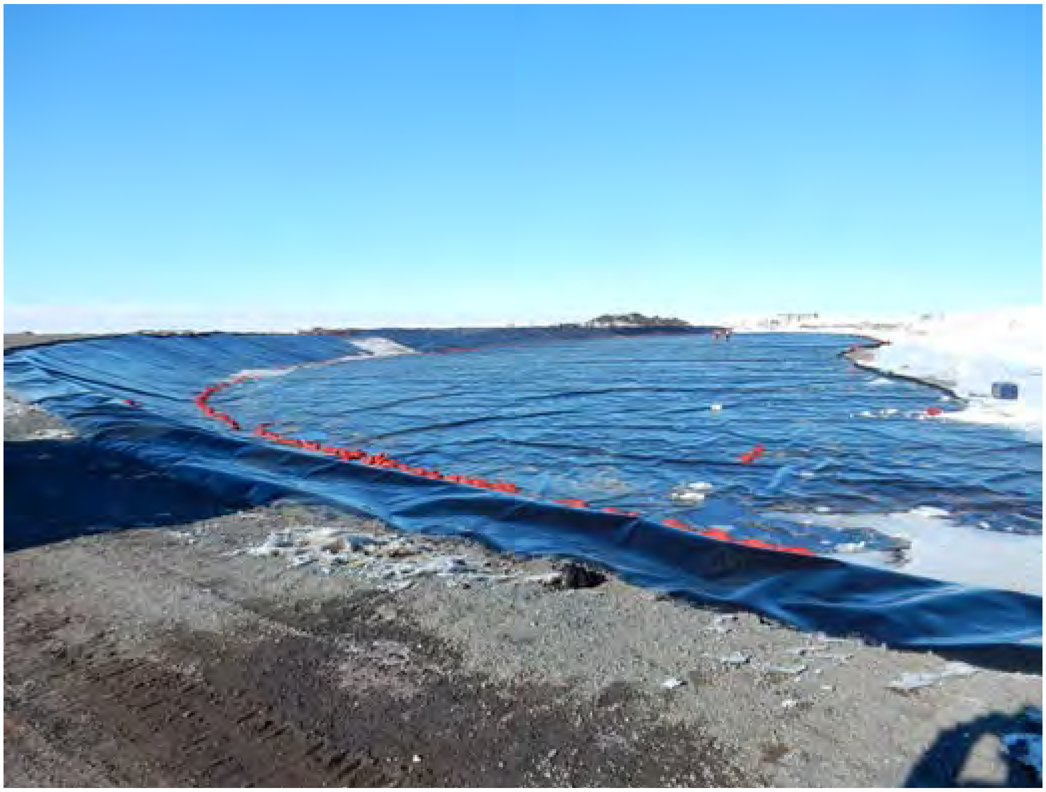


Figure 8: Liner Installation Complete

Figure 9: Ditch Excavation

Figure 10: Ditch After Excavation

Figure 11: Clearing Snow from Ditch

4. As-Built Drawings

The as-built drawings incorporate contractor provided and satellite survey data and contractor supplied field sketches. The as-built drawings are attached in Appendix B.

Table 4-1: Waste Rock Sedimentation Pond and Drainage Ditch As-Built Drawing List

Drawing Number	Title	Revision
H349000-4230-10-035-0001	Mine Site Waste Rock Sedimentation Pond Earthworks & Drainage – Plan	1
H349000-4230-10-035-0002	Mine Site Waste Rock Sedimentation Pond Earthworks & Drainage – Sections	1
H349000-4230-10-035-0003	Mine Site Waste Rock Drainage – Diversion Ditch Plan and Profile	0

5. Field Decisions

The following section describes field decisions made during construction:

- In some areas the design slope of 2:1 on the ditch walls was found to be too steep for the original ground material and the walls were collapsing during construction. A field decision was made to increase the slope up to 3:1 to achieve a stable ditch wall.
- The drainage slope of the ditch was reduced in the field due to differences in design topography data and that found in the field. As a result of this slope reduction the original ground was built up in some areas to achieve the bottom of ditch elevation. Ditch walls were built up from the elevation of the raised ditch bottom.
- In August 2017, after construction of the pond and ditch was completed, three additional ditches were dug upstream of the pond to direct water in to the pond, one in the centre of the pond and one at each end.

6. Performance Evaluation

The following issues have occurred with performance of the pond and ditch after completion of construction.

- The perimeter key that is designed to retain the pond liner on the upstream side of the pond collapsed due to poor ground conditions. As a result of this collapse, the liner lifted and allowed water under the liner. To remediate this issue, the liner was cut back and re-buried.
- There is a concern that water may be migrating underneath the liner in one location. Baffinland's Environmental Department is investigating this issue.

7. Vibration Monitoring and Quarrying Activity

No vibration monitoring was conducted during the construction of the Mine Site Waste Rock Sedimentation Pond and Drainage Ditch as it was not deemed necessary based on the scope of activities required for construction.

Control for quarrying activity was conducted as per the project's specific management plans:

- BAF-PH1-830-P16-0040 (H349000-4100-07-245-0001): Quarry Management Plan Mine Site Quarry (QMR2).
- BAF-PH1-830-P16-0004 (H349000-1000-07-126-0011): Borrow Pit and Quarry Management Plan

8. Environmental Monitoring

Environmental monitoring during the construction of the Mine Site Waste Rock Sedimentation Pond and Drainage Ditch was conducted as per the Environmental Protection Plan (EPP), Baffinland document number BAF-PH1-830-P16-0008.

In addition to the EPP, construction follows the requirements of the Environmental Health and Safety Management Framework, Baffinland document number BAF-PH1-830-STD-0001. The Baffinland on-site Environmental Management Team was responsible for environmental monitoring at all sites during construction and following-up with the construction team(s) if there were any reported environmental incidents or non-conformances.

Mine Site Waste Rock Sedimentation Pond and Drainage Ditch construction was also required to follow the requirements of the Surface Water and Aquatic Ecosystems Management Plan, BAF-PH1-830-P16-0026. This Management Plan outlines the best management practices implemented to limit the potential for adverse impacts to receiving waters, aquatic ecosystems, fish and fish habitat used during construction. In addition this plan details the systems in place to mitigate and manage drainage and runoff at the building sites, address point and non-point discharges to surface waters and assess those discharges on water quality and quantity relative to their receiving water systems.

The Spill Contingency Plan, BAF-PH1-830-P16-0036, in conjunction with the Emergency Response Plan, BAF-PH1-830-P16-0007, provides guidance and instructions for first responders and Baffinland Management in the event of a spill event or other emergency such as fire or accident.

The risks to the water quality in the respective rivers and streams as a result of construction of the Mine Site Waste Rock Sedimentation Pond and Drainage Ditch would originate from the following sources based on construction methodology:

- Spills from equipment
- Increase in sediment load in the water

There were no recorded spills from equipment used at the construction site. During the period of construction, water quality monitoring conducted at downstream stations under Part D, Section 16 and Part I, of the Type “A” Water Licence 2AM-MRY1325 indicated total suspended solids (TSS) and other parameter at levels below the specified Water License criteria. The results for water quality monitoring were provided in monthly reports submitted to the Nunavut Water Board and other stakeholders. In consideration of the above, the environmental mitigation strategies were effective in maintaining runoff water quality.

9. Earthworks Data

The survey data collected has been included in Appendix C.

10. Unanticipated Observations

The following unanticipated observations were made during construction of the pond and ditch.

- Surface topography in the ditch construction area did not match the Lidar survey data used to design the ditch alignment.
- A large snow bank remained in the ditch construction area and prevented a field check of the existing survey data prior to construction starting.
- The water table was located at the surface in the ditch construction area.
- The natural ground conditions are very poor. During the summer construction periods the existing ground turned to deep mud.
- Ditch side walls were collapsing during construction due to the poor ground conditions and high water table.
- Upon excavation of the existing ground, no permafrost was evident.
- A snowstorm in September 2016 prevented collection of final survey data. Data used to As Build the drawings is based on satellite survey data collected in August 2016.
- The liner key on the high side of the pond perimeter is built in to the original ground. During the 2016 summer, the liner key collapsed as a result of the poor ground conditions. To repair the pond, the liner was cut back and re-buried.
- In the summer 2015 construction period, the bottom of the ditch between 0+100 and 0+325 was over excavated and back filled. During the 2016 summer construction period, the back fill in this area became unstable and had to be removed and replaced with waste rock.

11. Surface Monitoring

Not conducted.

12. Required Maintenance

The following maintenance will be required for the pond and ditch.

- During construction of the ditch, the project ran out of rip rap, so one 125m long section of the ditch does not have rip rap installed. Rip rap will be installed in this section in 2017.
- An annual inspection and maintenance program for the ditch is recommended. The high volume of ground water and the poor quality of the original ground may result in movement of placed rip rap in to the original ground. The 50m section of ditch closest to the discharge point is of particular concern.

13. Adaptive Management

For discussion of adaptive management principles and practices applied during the Construction Phase of the Project and their overall effectiveness please refer to the 2015 Annual Report to the Nunavut Impact Review Board. Any additional adaptive management practices implemented as a result of works completed in 2016 will be reported in the updated 2016 Annual Report to the Nunavut Impact Review Board.

14. Concordance with Type “A” Water Licence

The Nunavut Water Board Type “A” Licence 2AM-MRY1325, Schedule D, outlines the requirements for Construction Monitoring Reports. The following table provides a concordance of the report, herein, with the requirements included in Part D.

Table 14-1: Table of Concordance for Schedule D

Schedule D Item No.	Schedule D Description	Corresponding Section in this Report
1a	description of all infrastructure and facilities designed and constructed to contain, withhold, divert or retain Water and/or Waste;	1
1b	a summary of construction activities including photographic records before, during and after construction of the facilities and infrastructure designed to contain, withhold, divert or retain Water and/or Waste;	2, 3
1c	as-built drawings and design for facilities and infrastructure, in Item 1(a) of this schedule, designed and constructed to contain, withhold, divert or retain Water and/or Waste;	4
1d	documentation of field decisions that deviate from the original plans and any data used to support or developed facilities and infrastructure to withhold, divert or retain Water and/or Waste;	5
1e	a comparison of measured versus predicted performance of infrastructure and facilities;	6
1f	any blast vibration monitoring and control for quarrying activity carried out in close proximity to fish bearing waters;	7
1g	monitoring conducted for sediment and explosives residue release from construction areas;	8
1h	monitoring undertaken in accordance with Part D of the during the Construction Phase of the Project;	8
1i	details confirming that the requirements of the CCME guidance document entitled “Aboveground Storage Tank Systems for Petroleum and Allied Petroleum Products (2003)” have been met by the Licensee;	N/A
1j	data collected from instrumentation used to monitor earthworks and the interpretation of that data;	9
1k	a discussion of any unanticipated observations including changes in risk and mitigation measures implemented to reduce risk during construction;	10
1l	an overview of any method including frequency used to monitor deformations, seepage and geothermal responses;	11
1m	a summary of maintenance work undertaken as a result of settlement or deformation of dikes and dams;	12
1n	a summary of adaptive management principles and practices applied during the relevant phases of the Project and their overall effectiveness.	13

Appendix A

Liner Data

LAYFIELD

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT NAME: Baffinland waste Rock Pond.
PROJECT NUMBER: Ct CCCO 71
OWNER: BIM
LOCATION: MaryRiver

I, the undersigned, a duly appointed representative of Layfield Environmental Systems Ltd. (LESL), have visually observed the soil subgrade described below, and found it to be an acceptable surface on which to install geomembrane.

This certification is based on observations of the surface of the subgrade only. No subterranean inspections or tests have been performed by Layfield Environmental Systems, and LESL makes no representations or warranties regarding conditions which may exist below the surface of the subgrade. Layfield Environmental Systems accepts no responsibility for conformance of the subgrade to this project's specifications.

The soil subgrade accepted on this date refers to its present condition. Any changes in the subgrade condition that result from the effects of inclement weather and/or other forces beyond the control of Layfield Environmental Systems and remedial work to correct the resulting deficiencies, will be the direct responsibility of the General Contractor.

Area Being Accepted: Waste Rock pond - 3/4 crush minor imperfections due to frozen ground, Area was Inspected and fixed as install took place 12,550 Sqm

LAYFIELD ENVIRONMENTAL SYSTEMS REPRESENTATIVE:

Date:	May/08/2016
Signature:	Matthew Bourne
Name:	Mathew Bourne
Title:	Supervisor

OWNERS REPRESENTATIVE:

Date:	May 9, 2016
Signature:	[signature]
Name:	Dave McCann
Title:	Construction Manager
Company:	OPC north for Baffinland.

LAYFIELD

CERTIFICATE OF FINAL INSPECTION AND ACCEPTANCE

PROJECT NAME: Baffinland Waste Rock Pond.
PROJECT NUMBER: CT-000071 **DATE:** May/08/2016
OWNER: BIM
LOCATION: Mary River

SCOPE OF INSTALLATION(S): THE WORK
Installation of LP7 on 3/4" crush and 12,550 Sq M of 6060 Geomembrane. Installed tested and completed.
Gross material used 13,208 Sq M
Net used 12,550
Calculated waste 5%

Part 1 – LAYFIELD ENVIRONMENTAL SYSTEMS LTD.

I, Mathew Bourne, a duly appointed representative of Layfield Environmental Systems Ltd. (LESL), have visually observed the installations (as outlined above), and have found the Work to be complete and free of defects and declare that the Work was completed in accordance with the project specifications, Layfield Environmental Systems' QC program and the terms and conditions of the contract.

Layfield Environmental Systems Representative:
Name: Mathew Bourne
Title: Supervisor
Date: May/08/2016 Signature: Mathew Bourne.

Part 2 – OWNER (or Representative)

I, Dave McCann, a duly appointed representative of Baffinland Iron Mines, do hereby take over and accept the installation(s) described above, and confirm that the work has been completed in accordance with the project specifications and the terms of the conditions of the contract.

I have evaluated and measured the work together with the Layfield Environmental Systems representative, and agree that the measurements shown are both true and correct, and that the installation has met our approval.

Owners Representative:
Name: Dave McCann
Title: Construction Mgr
Company: Baffinland Iron Mines
Date: May 9/16 Signature: [signature]

Comments:

LAYFIELD

CERTIFICATE OF FINAL INSPECTION AND ACCEPTANCE

PROJECT NAME: Baffinland waste Rock Pond
PROJECT NUMBER: Ct-000071 **DATE:** May/08/2016
OWNER: BIM
LOCATION: Mary River

SCOPE OF INSTALLATION(S): THE WORK
Installation of LP7 on 3/4"crush and 12,550 Sqm of 6060
Geomembrane installed tested and completed.
Gross Material used 13,208 Sq.M
Net used 12,550
Calculated waste 5%

Part 1 – LAYFIELD ENVIRONMENTAL SYSTEMS LTD.

I, Mathew Bourne, a duly appointed representative of Layfield Environmental Systems Ltd. (LESL), have visually observed the installations (as outlined above), and have found the Work to be complete and free of defects and declare that the Work was completed in accordance with the project specifications, Layfield Environmental Systems' QC program and the terms and conditions of the contract.

Layfield Environmental Systems Representative:
Name: Mathew Bourne
Title: Supervisor
Date: May/08/2016. Signature: [signature]

Part 2 – OWNER (or Representative)

I, ____________, a duly appointed representative of ____________, do hereby take over and accept the installation(s) described above, and confirm that the work has been completed in accordance with the project specifications and the terms of the conditions of the contract.

I have evaluated and measured the work together with the Layfield Environmental Systems representative, and agree that the measurements shown are both true and correct, and that the installation has met our approval.

Owners Representative:
Name:
Title:
Company:
Date: Signature:

Comments:

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : April/25/2016

Customer & Project Title : Baffinland

Job Number : Ct000071

Weather : Overcast

morning noon night

Description of Work Performed

Started day at 10:00 (Matt & Josh) at the Shop
got every thing Ready to go.
Thomas met up at 12:00
Drove to enterprise and Switched Driver Name Into thomas.
Started are Travels.
Stopped for Gas at on the run + took lunch.
continued on Route to Mirabel.
Arrived At Super 8 Mirabel at 8:00.
checked in and finished are day.

Mobilization # :

Labour

Name	Mathew Bourne	Joshua Bourne	Thomas Wheeler	Kenny Jeahen										
Total Hours	10	10	8	8										

Installation Production

Elapsed Calendar Days : 1

Elapsed Installation Days : 0

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	0						
Cumulative							

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.	1	48016													

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : T. Bruce [signature]

Signature : Mathew Bourne [signature]

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : April/26/2016

Customer & Project Title : Baffinland

Job Number : C10000071

Weather : Sunny -1° (morning) Sunny 1° (noon) overcast Snow -4 (night)

Description of Work Performed

Started day at 12:00
Checked out of Hotel
Drove to Airport
checked in At Airport
Waited for Plan take offs.
flew to Iqaluit and filled Plane for fuel.
Waited for all clear to land for Mary River
got the go ahead and flew to Mary,
landed and checked in.
Met Tyler from Hatch
got are Bags and whent to are tents
finished for the day at 10:30pm

Mobilization # :

Labour

Name	Joshua Bourne	Joshua Bourne	Mathew Bourne	Kenny Teahen										
Total Hours	10.5	10.5	10.5	10.5										

Installation Production

Elapsed Calendar Days : 2

Elapsed Installation Days : 0

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	0						
Cumulative							

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.															

Job Materials

Type	Sand Bags (ea)	Welding Rod (spool)	Batten Bar (lm)	Anchor Bolts (ea)	Caulking (tube)	Gasket (lm)	Banding (lm)	THF (gal)	Rags (box)	Thread (spool)	Wick Plates (ea)	Wick Rebar (ea)	Wick Shoes (ea)	Wick Mandrel (ft)	
Qty.															

Approved : T. Bruce [signature]

Signature : [signature]

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourke.

Date : April/27/2016

Customer & Project Title : Baffinland.

Job Number : Ct-000071

Weather : Snowing (morning) — (noon) — (night)

Description of Work Performed

Started are day At 6.00 Having are morning talk
waited for Bus to pick us up to Drive to other camp for [redacted] orientation
got to other camp and waited for plane to come in due to instructor
Being on plane.
at 11:30 we Started training
completed training 2.00
Had to Have crew Tested for TB After training
Got ahold of Bus Driver and Made it Back to Camp [illegible]
Got Ahold of Site contact and Drove up to See Pond
once we looked over the Pond we Drove Back to Camp to allow [illegible] Snow
Removel to Take place Nightshift will Be clearing Snow [illegible]

Mobilization # :

Labour

Name	Mathew Bourke	Jessica Bourke	Henry Bowen	Thomas Wieder										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 3

Elapsed Installation Days : 0

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	0						
Cumulative							

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.															

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]

Signature : [signature]

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : Apr/28/2016

Customer & Project Title : Baffinland

Job Number : Cl-00071

Weather : Sun/Blue sky All day
morning *noon* *night*

Description of Work Performed

Met up for 6:00 Had Meeting with Dave are Super with Baffin
got on a Bus to km 104 where we waited to Be picked up
to go up km 110 where pond is located
we Began setting up equipment and laying out panels
completed Bag lines for liner Install
all morning we cleaned snow with labours to have Adequate Subgrade
took lunch
After lunch we finish snow clearing to Be able to start liner
we Deployed two panels and Began welding Seam
The light plant that was used did not generate enough power for welder
And Had Two Burn outs as a result. We were able to use A welders generator
to finish the weld tom completed air test, we cleaned up & Drove Back to camp after
Balisting liner In place

Mobilization # :

Labour

Name	Mathew Bourne	Joshua Bourne	Thomas Wheeler	Kenny Teaker										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 4

Elapsed Installation Days : 1

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	1,074	1,074					
Cumulative	1,074	1,074					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.						1		1							

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]

Signature : Mathew Bourne

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : April/29/2016

Customer & Project Title : Baffinland

Job Number : CT-000071

Weather : Sun/Blue Sky All day
morning noon night

Description of Work Performed

Started are morning at 6:00 with safety meeting
Took Bus up to 104km where we waited pick up to Pond
got to site and completed Tool Box/FLRA
Began Moving Bag's for liner install
qualified welder + Began deploying panels
Install 2 Rolls + welded seams as we went
took lunch
qualified welder + continued Install
Installed 1 more Roll and Began Bagging liner down due to
Health + Safety Meeting at 5:00
Cleaned up and Drove to camp

Mobilization # :

Labour

Name	Mathew Bourne	Joshua Bourne	Thomas wheeler	Kenny Teahen										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 5

Elapsed Installation Days : 2

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	3,222	3,222					
Cumulative	4,296	4,296					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.						1		1							

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]

Signature : Mathew Bourne

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : Apr.1/30/2016

Customer & Project Title : Bass.nland

Job Number : C1000071

Weather : Sun/Blue Sky All day
morning / noon / night

Description of Work Performed

Started are day with meeting at camp
Drove up to pond
Preformed ToolBox/FLRA.
Started Textile on west end of pond while josh preformed qualification
Began Deploying Panels on floor
Completed 1 Roll and took lunch
Started panels on slope
Tom airtested all seams
we preped and welded Tie in
Cleaned up site at 5 30
Traveled to camp
Arrived at camp for 6.00 And finished are day

Mobilization # :

Labour

Name	Mathew Bourne	Joshua Bourne	Thomas Wheeler	Kenny Teakin										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 6

Elapsed Installation Days : 3

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	2,148	2,148					
Cumulative	6,444	6,444					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.						1		1							

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]

Signature : Mathew Bourne

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : May/01/2016

Customer & Project Title : [redacted] Baffinland

Job Number : C1000071

Weather : Overcast Light Snow all day
morning *noon* *night*

Description of Work Performed

Started the day at 6:00
Had weekly meeting Tell 6:30
Drove up to waste Rock pond
Completed Toolbox/FLRA qualified wedge welder
Started Textile on west end where Night Shift Removed Ramp
Deployed Panel's
Took lunch
Completed Tie-in and all Air test's
Began Deploying Textile on east side
Deployed one Panel
Bagged down edge and Installed textile on Berm edge for Back Fill
Cleaned up and drove to camp for 6:00

Mobilization # :

Labour

Name	Mathew Bourne	Joshua Bourne	Thomas Wheeler	Kenny Teakin										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 7

Elapsed Installation Days : 4

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	1,074	1,074					
Cumulative	7,518	7,518					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.						1		1							

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]

Signature : Mathew Bourne

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : May/02/2016

Customer & Project Title : Baffinland

Job Number : Ct 000071

Weather : Overcast -15° 30kwinds 45k gusts All day
(morning / noon / night)

Description of Work Performed

Started are day at 6:00
Had meeting
Traveled up to pond
High winds prevented us from Installation
we cleaned up Garbage on site
Helped with backfill of trench
Removed SandBags
Cleared snow from liners
[illegible]
[illegible] down to [illegible]
Drove to camp

Mobilization # :

Labour

Name	Mathew Bourne	[illegible]	[illegible]	[illegible]										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 8

Elapsed Installation Days : 4

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	0	0					
Cumulative	7,518	7,518					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.															

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]

Signature : Mathew Bourne

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourk

Date : May/[illegible]

Customer & Project Title : Baffinland

Job Number : Ct000071

Weather : 50k wind 80k gust overcast All day
morning *noon* *night*

Description of Work Performed

Started are day at 6:00
the wind was so High and all clean up was Done so we
Sat at camp and waited for any Break in weather
Got updated that the Road into the pond was Snowed in
Nuna Had plan's to clear Road in am

Mobilization # :

Labour

Name	Mathew Bourk	Joshua Bourk	Thomas Wheeler	Kenny Techun										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 9 Elapsed Installation Days : 4

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	0	0					
Cumulative	7,518	7,518					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.															

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved :

Signature : Mathew Bourk

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne   Date : May 04/2016

Customer & Project Title : Baffinland

Job Number : C1000071   Weather : 30 km winds 0°c Sun/cloud

morning   noon   night

Description of Work Performed

Started are day at 6:00
was told the Road was going to be worked on to Access pond
Mathew drove up. But couldn't get down to pond
we waited to go up when Road was clear
Around 1300hrs we got the go ahead.
got Ready and travelled up to pond
Began doing Repairs with a wind Break infront of Gun
Worked tell 5:30
cleaned up and returned to camp

Mobilization # :

Labour

Name	Mathew Bourne	Joshua Bourne	Thomas Whiteway	Kenny Trahan										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 10   Elapsed Installation Days : 4

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	0	0					
Cumulative	7,518	7,518					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.															

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]   Signature : Mathew Bourne

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : May/05/2016

Customer & Project Title : Baffinland

Job Number : C10000071

Weather : 0°c Sun + Blue Sky Allday

morning noon night

Description of Work Performed

Started our day at 6:00
Had meeting + traveled up to Pond
Preformed tool/Box/FLRA
Began doing Repairs on liner
Mathew + Labour Removed Snow to Continue Deployment
Completed Repairs by 11:00
Started Installing Textile
Took lunch
Continued textile and Deployed panels
Completed 2 Rolls and Bagged liner down
cleaned up and Headed for camp
Had to wait for Blast to Be done Because were unable to complete weld Before
last call to leave mountain

Mobilization # :

Labour

Name	Mathew Bourne	Joshua David	Thomas wheeler	Kenny Teaken										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 11

Elapsed Installation Days : 5

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	2,148	2,148					
Cumulative	9,666	9,666					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.						1	1	1			1				

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]

Signature : Mathew Bourne

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne

Date : May/06/206

Customer & Project Title : Baffinland Waste Rock pond

Job Number : Ct cccc71

Weather : Overcast (*morning*) Sun/clouds (*noon*) (*night*)

Description of Work Performed

Started are day at 6:00
Had meeting
Traveled to pond
Completed ToolBox/FLRA
Began laying textile
Deployed Panels
Took lunch
continued deployment
Preped Tie-in
welded Tested Area
Bagged down liner cleaned up and headed to camp

Mobilization # :

Labour

Name	Mathew Bourne	Joshua Bourne	Thomas wheeler	Kenny Teaber										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 12

Elapsed Installation Days : 6

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	2,148	2,148					
Cumulative	11,814	11,814					

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.						1	1	1							

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]

Signature : Mathew Bourne

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourne   Date : May/07/2016

Customer & Project Title : Baffinland waste Rock pond

Job Number : CT-C00071   Weather : Sun/Blue Sky All day 15h with 20 k wind at Times
morning *noon* *night*

Description of Work Performed

Started at 600
Had meeting
Drove to Site and preformed ToolBox/FLRA
Began Textile area cleaned up and Had excavator Remove rest of Ramp
and Smoothened Subgrade
Installed floor panels
completed Remainder of Textile
Deployed slope panels
Preped Tie-in and completed
welded + Tested
Walk Entire pond for Repairs.
Completed waste Rock pond of Install + Repairs cleaned up and Headed to camp

Mobilization # :

Labour

Name	Mathew Bourne	Joshua Bourne	Thomas wheeler	Kenny Teahin										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 13   Elapsed Installation Days : 7

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date	1,394	1,394	[illegible]				
Cumulative	13,208	13,208	12,550				

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.						1	1	1							

Job Materials

Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.		1.25													
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

Approved : [signature]   Signature :

LAYFIELD

Daily Installation Report

(revised Feb/08)

Supervisor : Mathew Bourke   Date : May/08/2016

Customer & Project Title : Bassinland

Job Number : C1 00071   Weather : Sun/Blue sky All day
morning *noon* *night*

Description of Work Performed

Started are day at 6:00
went and Had Safety meeting tell 6:30
Drove up to Site
Cleared up all GarBage on Site
Put left over Material (Roll of Liner + Textile) In a pile
Began watching BackFill Take place as we cleared usable SandBag's on
a Pallet (Takin From the Top of Slope)
Remainder of Bags left on Toe for Ballast
loaded equipment Into are Shipping Box and Drove it down to warehouse
Tom worked on QC all day
Mathew Helped with GPS (Survey) Map out Panel layout
Traveled Back to camp

Mobilization # :

Labour

Name	Mathew Bourke	Joshua Bewitt	Thomas wheeler	Kenny Tauhin										
Total Hours	12	12	12	12										

Installation Production

Elapsed Calendar Days : 14   Elapsed Installation Days : 7

Material Production / Recap Info	Liner Installed (sq.m.) or (sq.ft.)	Liner Tested (sq.m.) or (sq.ft.)	Geotextile (sq.m.) or (sq.ft.)	Geonet (sq.m.) or (sq.ft.)	Other: (sq.m.) or (sq.ft.)	Wick Drain (ft) or (m)	Wick Drain # of wicks
Today's date							
Cumulative							

Equipment

Type	Truck	Mileage	Flat Deck Trailer	Cargo Trailer	ATV	Wedge Welder	Extrusion Welder	Tensio-meter	Genset	Compres.	Leister	Hilti	Sewing Machine	Wick Machine	
Qty.															

Job Materials

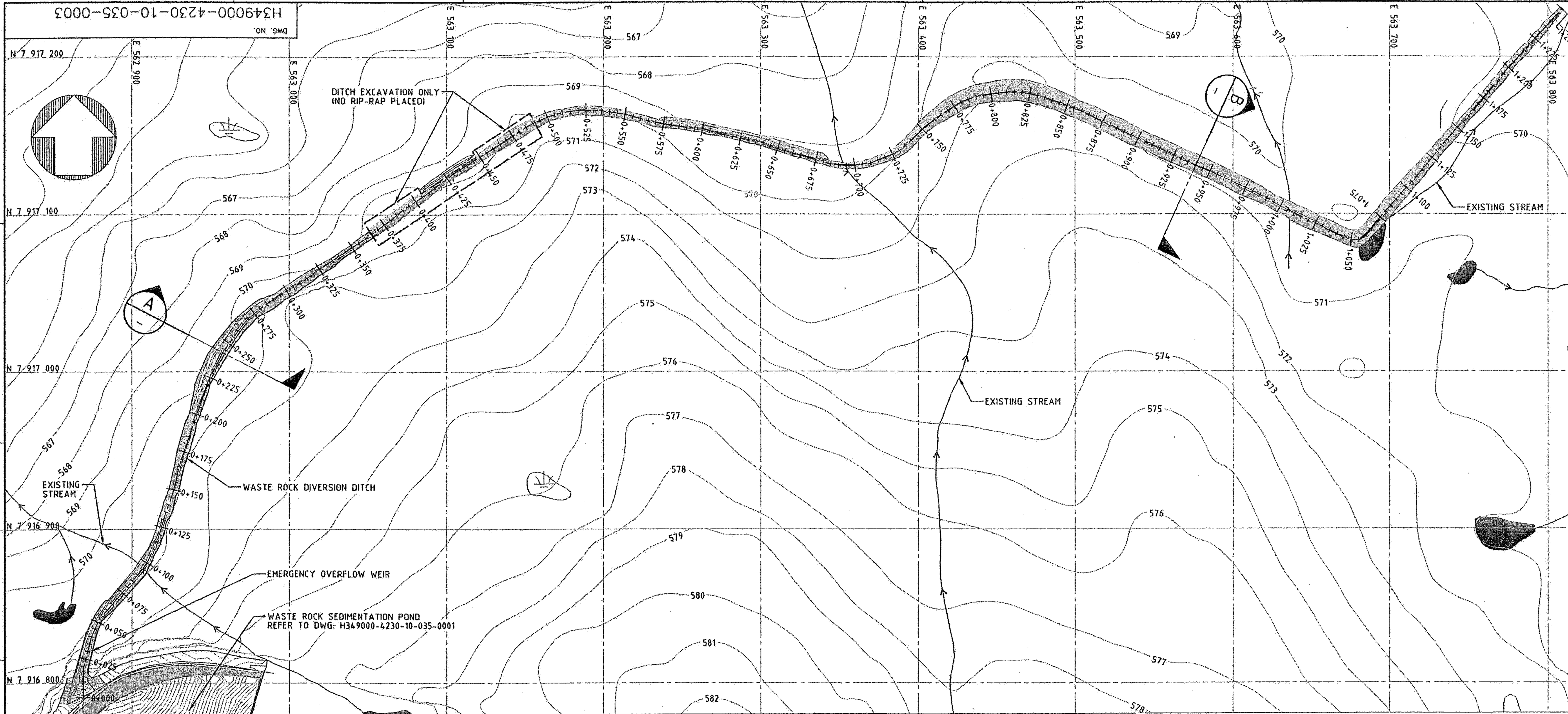
Type	Sand Bags	Welding Rod	Batten Bar	Anchor Bolts	Caulking	Gasket	Banding	THF	Rags	Thread	Wick Plates	Wick Rebar	Wick Shoes	Wick Mandrel	
Qty.															
	(ea)	(spool)	(lm)	(ea)	(tube)	(lm)	(lm)	(gal)	(box)	(spool)	(ea)	(ea)	(ea)	(ft)	

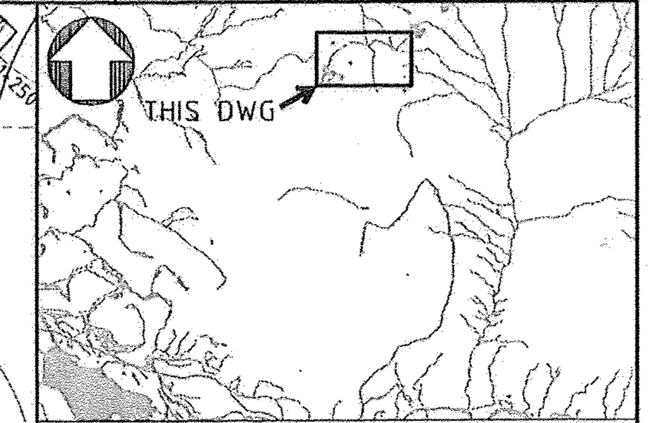
Approved : [signature]   Signature : Mathew Bourke

Appendix B

As-Built Drawings

DWG. NO. H349000-4230-10-035-0003





KEY PLAN

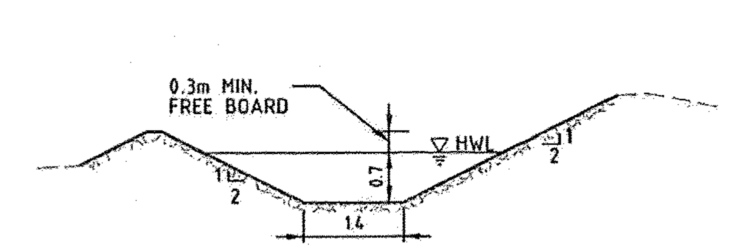
LEGEND:

- CENTERLINE OF DITCH
- EXISTING WATER BODIES
- EXISTING GROUND CONTOURS
- EXISTING STREAM
- OVERLAND FLOW PATH
- FILL SLOPE
- CUT SLOPE

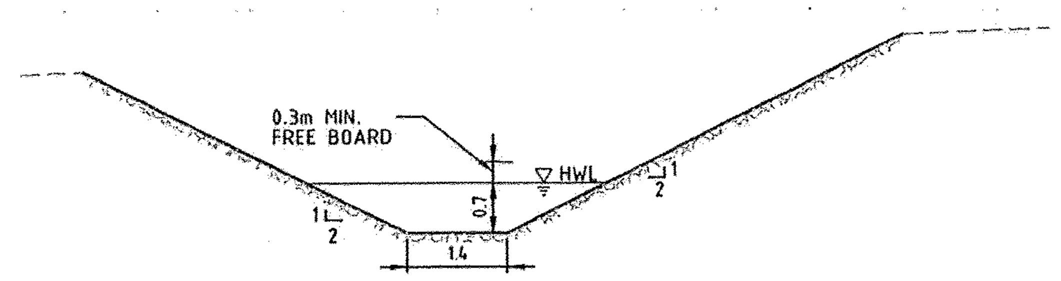
NOTES:

1. WASTE ROCK SEDIMENTATION POND AND DIVERSION DITCH AS-BUILT DATA PROVIDED BY BAFFINLAND. FILE NAME: CAB160918 WR POND-DITCH.CSV & CAB160918 WR POND-DITCH.DWG
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. EXISTING GROUND CONTOUR INTERVAL IS 1.0m. AS-BUILT DIVERSION DITCH AND SEDIMENTATION POND CONTOUR INTERVAL IS 0.1m
4. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METRES UNLESS NOTED OTHERWISE.

AS BUILT



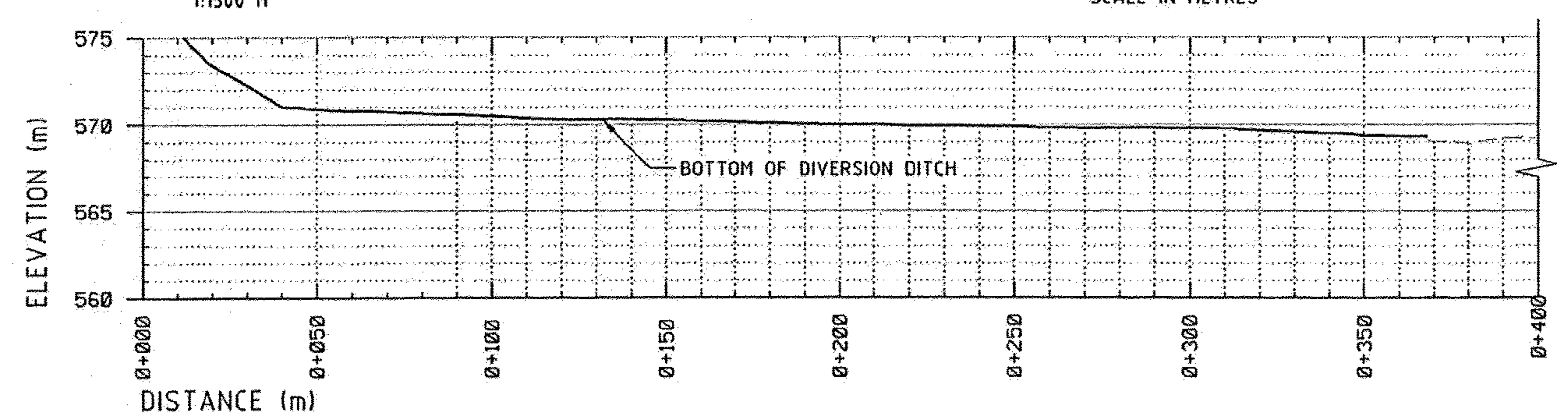
TYPICAL DITCH CROSS-SECTION A
N.T.S.

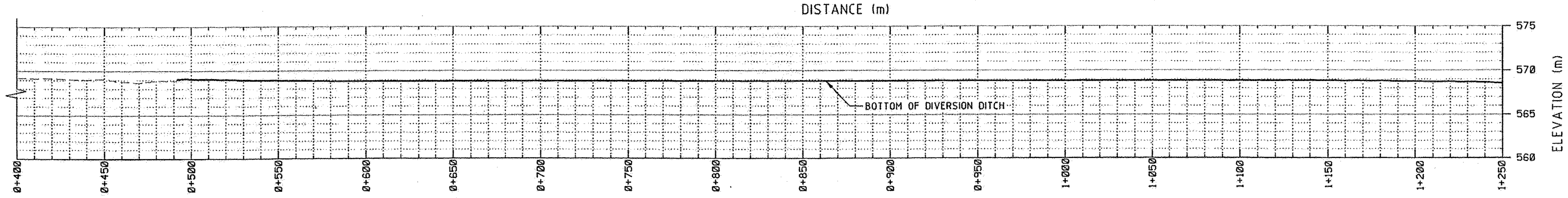


TYPICAL DITCH CROSS-SECTION B
N.T.S.

DIVERSION DITCH-PLAN
1:1500 H

SCALE IN METRES





DIVERSION DITCH-PROFILE
1:1500 H
1:300 V

DRAWING NO.	DRAWING TITLE
H349000-4320-10-035-0002	WASTE ROCK SEDIMENTATION POND-EARTHWORKS & DRAINAGE-SECTIONS
H349000-4320-10-035-0001	WASTE ROCK SEDIMENTATION POND-EARTHWORKS & DRAINAGE-PLAN
H349000-4000-00-014-0001	MINE SITE – SITE LAYOUT

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
0	AS-BUILT	AM	LJ	MB	2017-01-23

REVISIONS

REV.	ISSUE FOR	AUTH.	BY	DATE
0	AS-BUILT	MB	AM	2017-01-23

ISSUE AUTHORIZATION

HATCH

DESIGNED BY G. JUBINVILLE DATE 2014-03-19	DRAWN BY G. JUBINVILLE DATE 2014-03-19
CHECKED BY A. MOHEBKHANI DATE 2014-03-19	DISCIP. ENGR. S. HASSAN DATE 2014-03-19
PROJ. DES. COORD. T. THERTELL DATE 2014-03-19	PROJ. ENGR. J. CLELAND DATE 2014-03-19
PROJ. MGR. S. PERRY DATE 2014-03-19	

Baffinland

MARY RIVER PROJECT

MINE SITE
WASTE ROCK DRAINAGE – DIVERSION DITCH
PLAN AND PROFILE

SCALE 1:1500 OR AS NOTED

DWG. NO. H349000-4230-10-035-0003

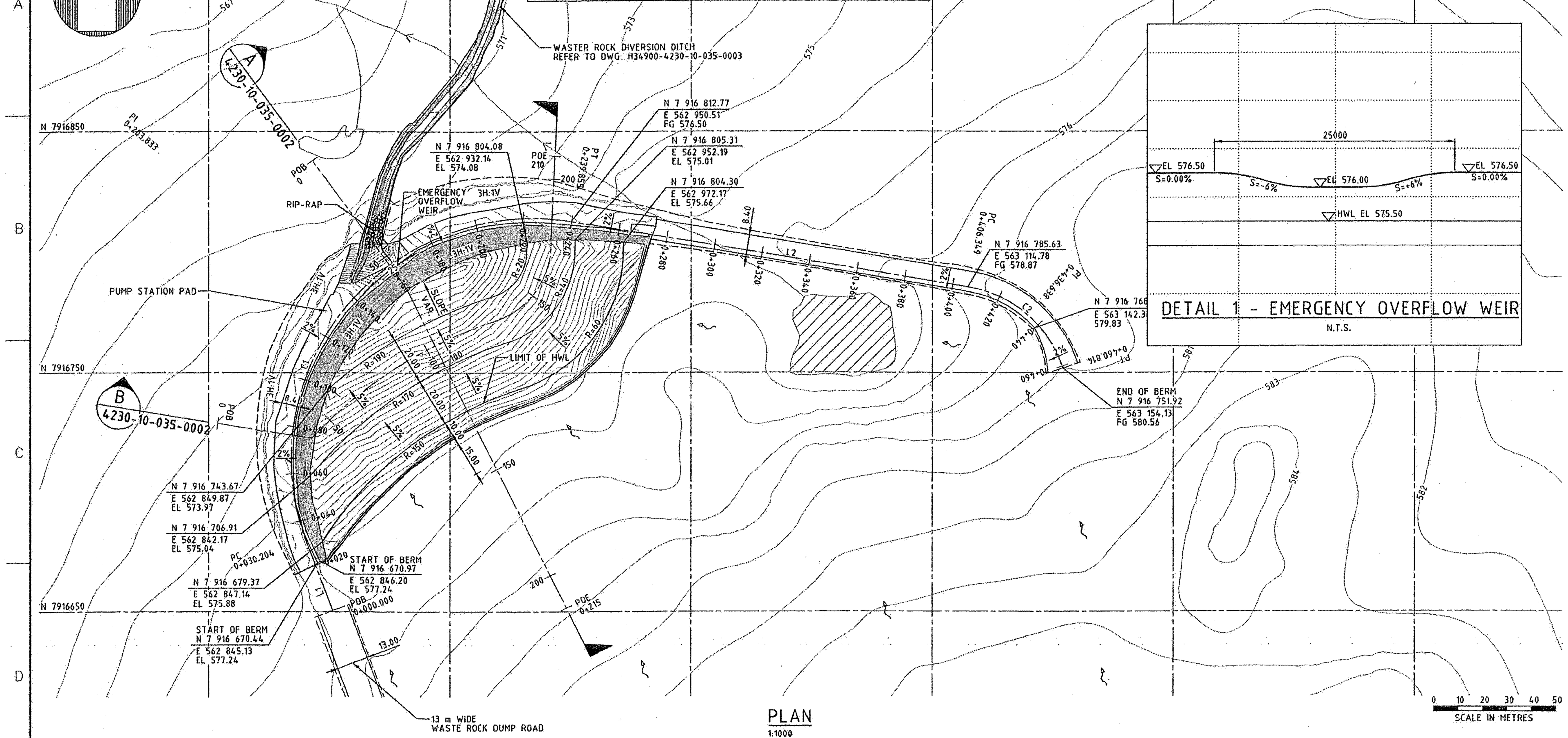
REV. 0

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

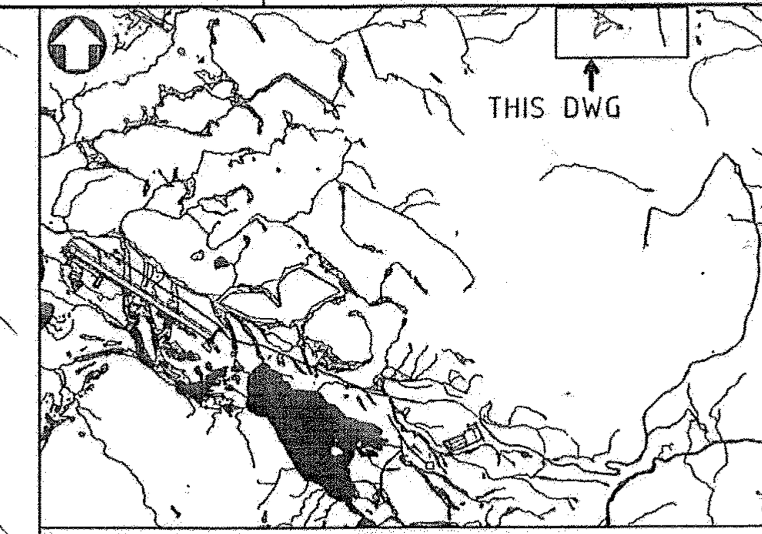
DWG. NO. H349000-4230-10-035-0001

LINE TABLE		
NAME	LENGTH	DIRECTION
L1	30.2036	N 20°44'27.00" W
L2	166.4'	S 80°37'10.35" E

CURVE TABLE							
NAME	RADIUS	ARC LENGTH	CHORD LENGTH	TANGENT LENGTH	MIDDLE ORDINATE	EXTERNAL DISTANCE	CHORD DIRECTION
C1	100.00	209.6512	173.3108	173.6292	50.0917	100.3674	N 39 °19'11.33" E
C2	50.00	54.4653	51.8121	30.2886	7.2346	8.4585	S 49 °24'47.60" E



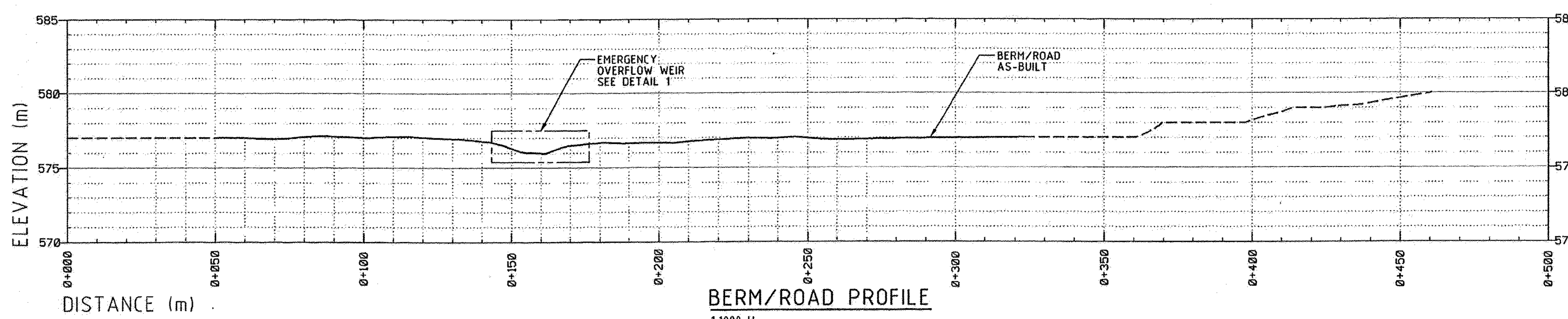
PLAN
1:1000



KEY PLAN

LEGEND:

- EXISTING WATER BODY
- EXISTING DEPRESSION
- EXISTING GROUND CONTOUR
- FILL SLOPE
- TOE OF SLOPE
- GRADING SLOPE
- FLOW DIRECTION
- RIP RAP
- CROSS SECTION DISTANCE
- PT — POINT OF TANGENT
- PC — POINT OF CURVE
- PI — POINT OF INTERSECTION
- POB — POINT OF BEGINNING
- POE — POINT OF END
- HWL — HIGH WATER LEVEL
- FB — FREEBOARD



BERM/ROAD PROFILE
1:1000 H
1:200 V

NOTES:

1. WASTE ROCK SEDIMENTATION POND AND DIVERSION DITCH AS-BUILT DATA PROVIDED BY BAFFINLAND. FILE NAME: CAB160918 WR POND-DITCH.CSV & CAB160918 WR POND-DITCH.DWG
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. EXISTING GROUND CONTOUR INTERVAL IS 1.0m. AS-BUILT DIVERSION DITCH AND SEDIMENTATION POND CONTOUR INTERVAL IS 0.1m
4. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METRES UNLESS NOTED OTHERWISE.

AS BUILT

DRAWING NO.	DRAWING TITLE
H349000-4320-10-035-0003	WASTE ROCK DRAINAGE-DIVERSION DITCH PLAN & PROFILE
H349000-4320-10-035-0002	WASTE ROCK SEDIMENTATION POND-EARTHWORKS & DRAINAGE-SECTIONS
H349000-4000-00-014-0001	MINE SITE - SITE LAYOUT

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS-BUILT	AM	LJ	MB	2017-01-23

REVISIONS

REV.	ISSUE FOR	AUTH.	BY	DATE
1	AS-BUILT	MB	AM	2017-01-23
0	CONSTRUCTION	SH	RM	2013-08-30

ISSUE AUTHORIZATION

HATCH

DESIGNED BY R.MANOOCHEHRI DATE 2013-08-26	DRAWN BY R MANOOCHEHRI DATE 2013-08-26
CHECKED BY A. SAHELI DATE 2013-08-30	DISCIP. ENGR. S. HASSAN DATE 2013-08-30
PROJ. DES. COORD. T. THERTELL DATE 2013-08-30	PROJ. ENGR. J. CLELAND DATE 2013-08-30
PROJ. MGR. S. PERRY DATE 2013-08-30	

Baffinland

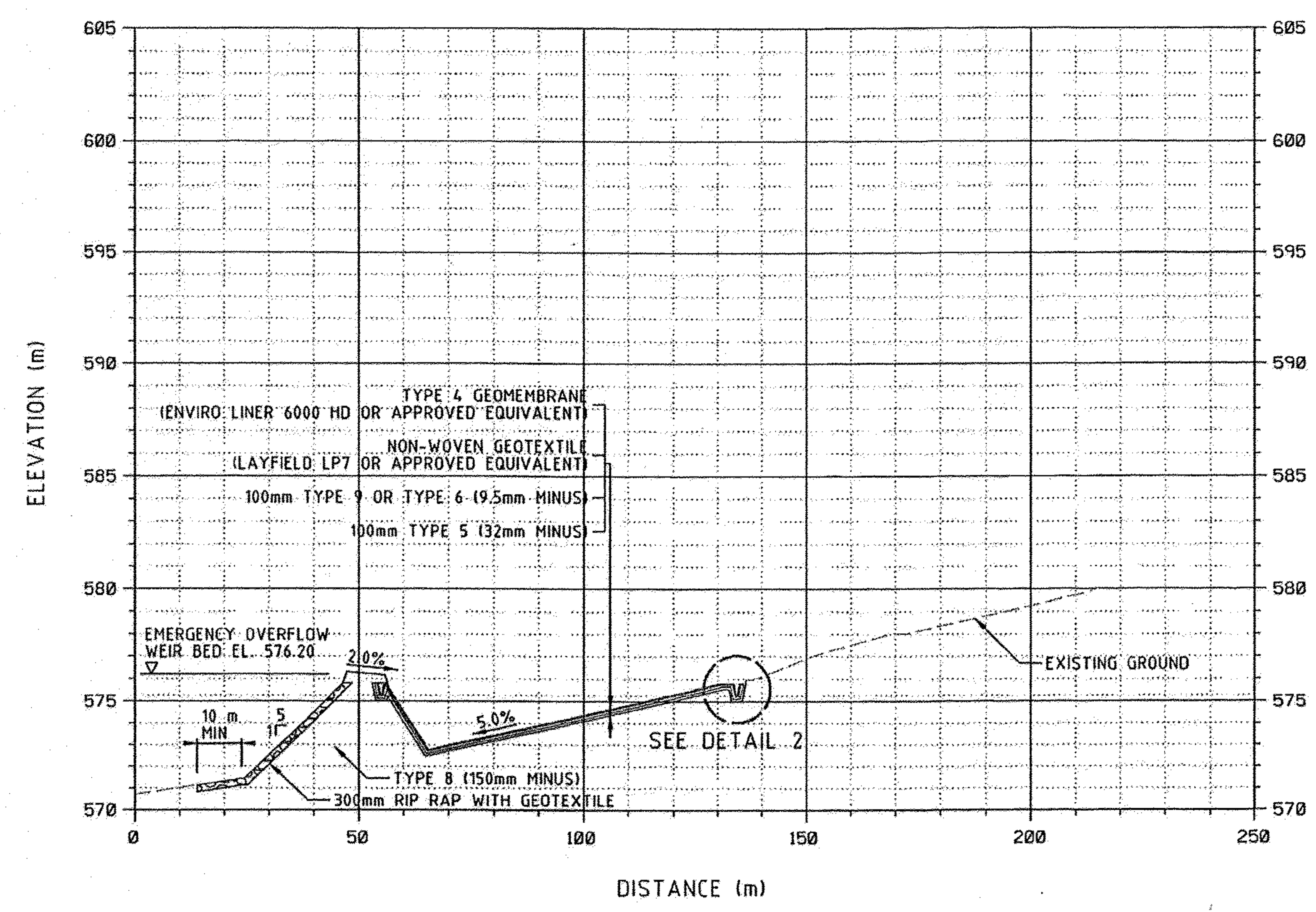
MARY RIVER PROJECT

MINE SITE
WASTE ROCK SEDIMENTATION POND
EARTHWORKS & DRAINAGE - PLAN

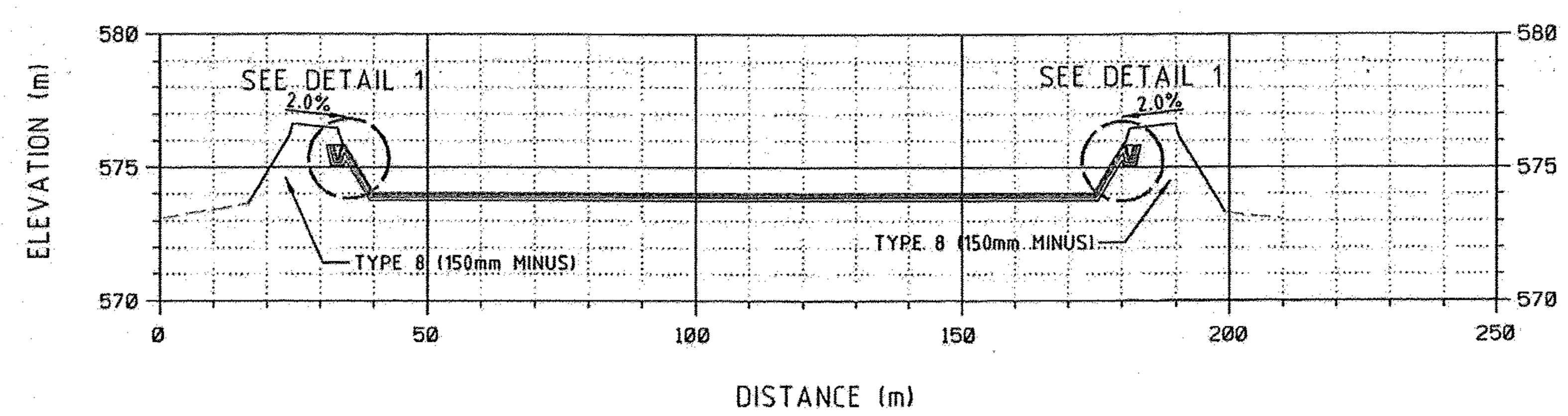
SCALE	DWG. NO.	REV.
1:1000 OR AS NOTED	H349000-4230-10-035-0001	1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

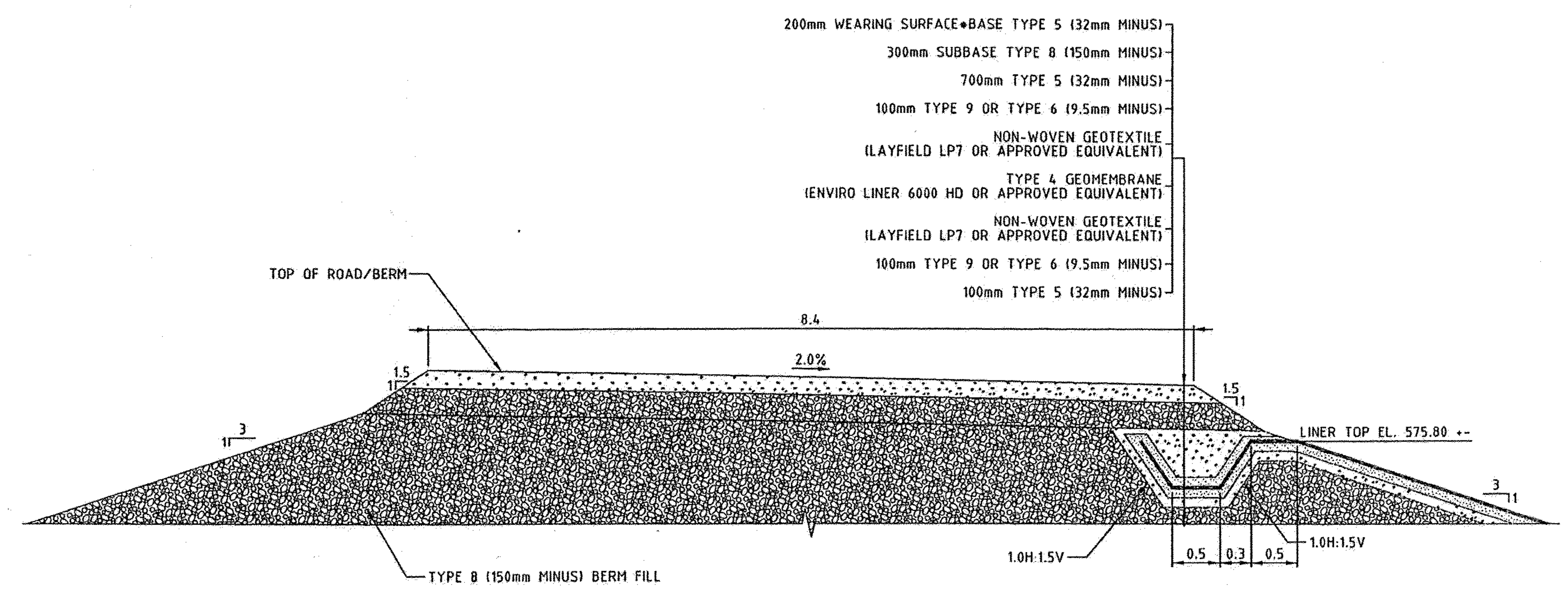
$USERNAME$ $DATE$ $FILE$ $TIME$



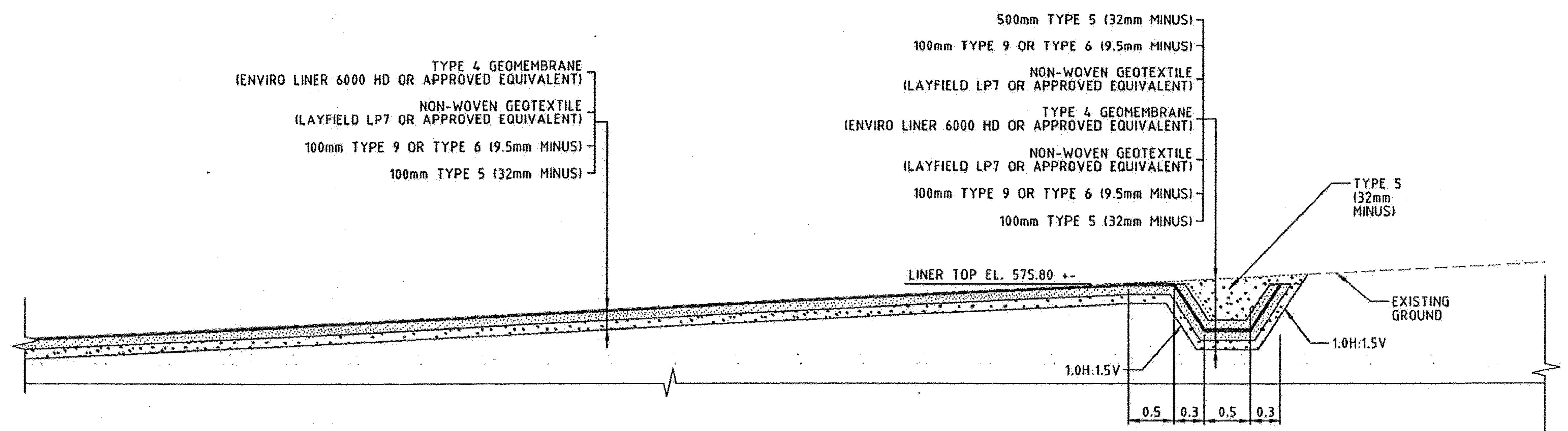
SECTION A
1:1000 H
1:200 V
4230-10-035-0001



SECTION B
1:1000 H
1:200 V
4230-10-035-0001



DETAIL - TYPICAL ROAD/POND BERM CROSS SECTION (1)
NTS



DETAIL - TYPICAL POND PERIMETER LINER (2)
NTS

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA NC.
2. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METERS UNLESS NOTED OTHERWISE.

AS BUILT

LEGEND

%	GRADING SLOPE
HWL	HIGH WATER LEVEL
FB	FREE BOARD

REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE
H349000-4230-10-035-0003	WASTE ROCK DRAINAGE-DIVERSION DITCH-PLAN & PROFILE
H349000-4230-10-035-0001	WASTE ROCK SEDIMENTATION POND-EARTHWORKS & DRAINAGE-PLAN

REVISIONS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS-BUILT	AM	LJ	MB	2017-01-23

ISSUE AUTHORIZATION

REV.	ISSUE FOR	AUTH. BY		DATE
1	AS-BUILT	MB	AM	2017-01-23
0	CONSTRUCTION	SH	RM	2013-08-30

HATCH

DESIGNED BY R. MANOOCHEHRI DATE 2013-08-26	DRAWN BY R. MANOOCHEHRI DATE 2013-08-26
CHECKED BY S. SAHELI DATE 2013-08-30	DISCIP. ENGR. S. HASSAN DATE 2013-08-30
PROJ. DES. COORD. T. THERTELL DATE 2013-08-30	PROJ. ENGR. J. CLELAND DATE 2013-08-30
PROJ. MGR. S. PERRY DATE 2013-08-30	

Baffinland

MARY RIVER PROJECT

MINE SITE
WASTE ROCK SEDIMENTATION POND
EARTHWORKS & DRAINAGE - SECTIONS

SCALE 1:1000 OR AS NOTED
DWG. NO. H349000-4230-10-035-0002
REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

DWG. NO. H349000-4230-10-035-0002

Appendix C

Survey Data

CAB 160902 WRP Ditch Excavation

Point No.	Northing	Easting	Elevation	Location
1239055	7917178.513	563464.53	568.573	EXC TOE
1239058	7917132.118	563368.7183	568.673	EXC TOE
1239059	7917133.151	563368.3571	568.647	EXC TOE
1239060	7917133.376	563373.0869	568.638	EXC TOE
1239061	7917134.388	563372.831	568.645	EXC TOE
1239062	7917176.842	563475.0156	568.635	EXC TOE
1239063	7917130.658	563359.544	568.631	EXC TOE
1239064	7917131.653	563359.434	568.651	EXC TOE
1240012	7917135.882	563378.073	568.637	EXC TOE
1240013	7917134.836	563378.083	568.643	EXC TOE
1240015	7917140.46	563386.6885	568.644	EXC TOE
1240018	7917156.04	563405.863	568.63	EXC TOE
1240019	7917156.65	563405.09	568.629	EXC TOE
1240021	7917129.649	563355.028	569.118	EXC CREST
1240022	7917129.456	563357.768	569.17	EXC CREST
1240023	7917129.405	563360.643	569.233	EXC CREST
1240024	7917129.742	563363.61	569.113	EXC CREST
1240025	7917130.533	563365.366	569.054	EXC CREST
1240026	7917130.935	563368.339	569.134	EXC CREST
1240027	7917131.256	563369.192	569.057	EXC CREST
1240028	7917132.611	563353.041	568.979	EXC CREST
1240029	7917132.708	563355.215	569.143	EXC CREST
1240030	7917132.871	563357.46	569.209	EXC CREST
1240031	7917132.717	563358.712	569.132	EXC CREST
1240032	7917133.093	563361.177	569.224	EXC CREST
1240033	7917134.466	563366.625	569.429	EXC CREST
1240034	7917134.994	563368.529	569.419	EXC CREST
1240035	7917136.284	563372.267	569.53	EXC CREST
1240036	7917138.037	563377.182	569.691	EXC CREST
1240037	7917140.097	563381.713	569.85	EXC CREST
1240040	7917158.412	563408.771	568.613	EXC TOE
1240041	7917159.245	563408.303	568.635	EXC TOE
1240047	7917131.632	563373.294	569.461	EXC CREST
1240048	7917131.653	563373.294	569.458	EXC CREST
1240049	7917132.473	563376.023	569.457	EXC CREST
1240050	7917133.385	563379.453	569.538	EXC CREST
1240051	7917134.739	563381.557	569.421	EXC CREST
1240052	7917135.913	563385.623	569.608	EXC CREST
1240053	7917137.618	563388.45	569.72	EXC CREST
1240054	7917139.947	563392.277	569.949	EXC CREST
1240055	7917142.976	563395.071	569.871	EXC CREST
1240056	7917145.146	563397.894	569.963	EXC CREST
1240057	7917149.033	563401.267	569.965	EXC CREST
1240058	7917152.09	563404.747	569.96	EXC CREST
1240059	7917153.976	563407.162	570.126	EXC CREST

Point No.	Northing	Easting	Elevation	Location
1240060	7917155.541	563409.842	570.175	EXC CREST
1240061	7917157.677	563413.57	570.319	EXC CREST
1240062	7917160.319	563417.802	570.567	EXC CREST
1240066	7917147.121	563394.823	568.622	EXC TOE
1240067	7917153.797	563401.6178	568.634	EXC TOE
1240073	7917165.484	563418.776	568.635	EXC TOE
1240074	7917166.483	563418.197	568.643	EXC TOE
1240077	7917171.552	563426.2775	568.651	EXC TOE
1240079	7917175.241	563435.8535	568.605	EXC TOE
1240093	7917177.053	563445.4949	568.665	EXC TOE
1240096	7917177.19	563458.6374	568.816	ROCK
1240097	7917178.011	563453.7023	568.638	EXC TOE
1240098	7917178.241	563458.5274	568.62	EXC TOE
1241003	7917227.01	563806.479	568.57	TOE
1241004	7917224.918	563804.74	568.608	TOE
1241006	7917225.948	563804.342	568.577	EXC
1241007	7917221.509	563801.712	568.595	EXC
1241008	7917221.515	563801.713	568.551	EXCT
1241009	7917221.317	563800.237	568.616	EXCT
1241010	7917211.927	563789.942	569.09	EXCC
1241012	7917212.8	563795.655	568.839	EXC C
1241013	7917216.75	563799.035	568.773	EXC C
1241014	7917220.686	563802.317	568.809	EXC C
1241015	7917224.299	563806.049	568.771	EXC C
1241016	7917227.211	563809.133	568.717	EXC C
1241017	7917229.208	563811.153	568.693	EXC C
1241018	7917230.638	563811.695	568.614	EXC DL
1241019	7917230.749	563810.818	568.347	EXC DL
1241020	7917231.45	563810.842	568.512	EXC DL
1241021	7917232.023	563809.886	568.623	EXC DL
1241022	7917232.262	563808.39	568.617	EXC C
1241023	7917229.738	563805.819	568.705	EXC C
1241024	7917226.559	563803.281	568.774	EXC C
1241025	7917223.168	563799.805	568.89	EXC C
1241026	7917216.874	563797.698	568.521	EXC T
1241027	7917217.789	563797.078	568.501	EXC T
1241028	7917176.771	563617.216	569.284	NATURAL DRAIN
1241029	7917179.817	563613.179	569.281	NATURAL DRAIN
1241030	7917179.346	563610.506	569.225	NATURAL DRAIN
1241031	7917173.522	563609.968	569.268	NATURAL DRAIN
1241034	7917183.896	563769.039	568.551	EXC T
1241035	7917189.759	563773.6137	568.493	EXC T
1241036	7917193.602	563776.5841	568.479	EXC T
1241037	7917197.042	563780.012	568.493	EXC T
1241038	7917201.467	563783.9445	568.606	EXC T
1241039	7917205.867	563787.996	568.407	EXC T
1241040	7917209.685	563791.307	568.555	EXC T

Point No.	Northing	Easting	Elevation	Location
1241041	7917214.843	563795.939	568.547	EXC T
1241042	7917213.555	563794.713	568.557	EXC T
1241043	7917208.429	563791.896	568.875	EXC C
1241044	7917205.042	563788.96	569.112	EXC C
1241045	7917200.794	563785.032	569.007	EXC C
1241046	7917195.715	563780.521	569.197	EXC C
1241047	7917192.367	563777.941	569.18	EXC C
1241048	7917188.541	563775.137	569.395	EXC C
1241049	7917182.289	563770.64	569.364	EXC C
1241050	7917178.093	563766.718	569.41	EXC C
1241051	7917179.292	563765.351	568.539	EXC T
1241052	7917163.979	563506.2257	568.659	EXC TOE
1241055	7917160.864	563500.397	571.078	EXC C
1241056	7917164.772	563491.588	570.872	EXC C
1241057	7917168.908	563493.589	568.643	EXC T
1241063	7917168.032	563482.249	570.993	EXC CREST
1241064	7917168.082	563482.273	571.002	EXC CREST
1241065	7917171.002	563472.85	571.113	EXC CREST
1241066	7917172.666	563464.674	571.12	EXC CREST
1241067	7917172.332	563455.082	571.063	EXC CREST
1241068	7917171.504	563445.634	571.094	EXC CREST
1241069	7917170.114	563437.005	571.002	EXC CREST
1241070	7917166.666	563428.993	570.676	EXC CREST
1241071	7917161.975	563420.25	570.506	EXC CREST
1241090	7917157.497	563749.009	569.453	EXC CREST
1241092	7917159.317	563747.838	568.575	EXC TOE
1241093	7917160.474	563747.394	568.501	EXC TOE
1241094	7917167.358	563755.03	568.424	EXC TOE
1241095	7917165.663	563756.589	569.399	EXC CREST
1241096	7917172.227	563759.2985	568.47	EXC TOE
1241097	7917170.395	563760.318	569.246	EXC CREST
1241104	7917148.648	563526.22	571.086	C
1241105	7917149.413	563535.439	568.613	EXC TOE
1241107	7917144.869	563533.571	571.063	EXC CREST
1241108	7917152.098	563518.801	571.118	EXC CREST
1241109	7917156.71	563509.937	571.096	EXC CREST
1242018	7917161.12	563512.1298	568.646	TOE
1242019	7917156.694	563520.9894	568.59	TOE
1242022	7917137.518	563550.494	570.755	EXC CREST
1242023	7917138.351	563558.393	568.614	EXC TOE
1242025	7917135.446	563554.735	570.865	EXC CREST
1242026	7917127.742	563572.108	570.774	EXC CREST
1242027	7917131.555	563573.431	568.537	EXC TOE
1242028	7917131.292	563564.01	570.82	EXC CREST
1242029	7917135.126	563565.9593	568.643	EXC TOE
1242030	7917126.685	563584.471	568.63	EXC TOE
1242032	7917123.137	563582.394	570.729	EXC CREST

Point No.	Northing	Easting	Elevation	Location
1242033	7917124.427	563589.297	568.589	EXC TOE
1242037	7917113.104	563603.272	570.661	EXC CREST
1242038	7917117.195	563604.242	568.627	EXC TOE
1242039	7917118.939	563591.712	570.504	EXC CREST
1242040	7917122.797	563592.903	568.553	EXC TOE
1242041	7917091.422	563640.475	569.911	FLOWH2O
1242042	7917091.593	563634.404	569.951	FLOWH2O
1242044	7917107.799	563614.926	570.379	EXC CREST
1242046	7917110.395	563609.903	570.297	EXC CREST
1242047	7917113.948	563611.383	568.543	EXC TOE
1242048	7917114.203	563600.389	570.632	EXC CREST
1242049	7917118.327	563602.321	568.638	EXC TOE
1242050	7917104.844	563701.759	568.618	EXC TOE
1242053	7917150.401	563740.4325	568.651	EXC TOE
1242054	7917145.863	563736.5723	568.608	EXC TOE
1242055	7917137.23	563729.306	568.651	EXC TOE
1242056	7917129.77	563723.393	568.635	EXC TOE
1242057	7917122.76	563715.5252	568.686	EXC TOE
1242058	7917121.996	563716.867	568.609	EXC TOE
1242059	7917114.582	563710.286	568.633	EXC TOE
1242060	7917080.63	563680.0566	569.188	EXC CREST
1242064	7917102.26	563633.27	568.464	EXC TOE
1242066	7917087.982	563687.683	568.658	EXC TOE
1242067	7917085.918	563689.337	570.121	EXC CREST
1242068	7917092.217	563695.544	570.27	EXC CREST
1242069	7917094.175	563692.9526	568.5501	TOE
1242070	7917099.167	563697.3553	568.625	TOE
1242071	7917098.4	563700.951	570.235	EXC CREST
1242072	7917103.133	563704.304	570.174	EXC CREST
1242073	7917111.829	563712.3	570.246	EXC CREST
1242074	7917120.598	563718.878	569.886	EXC CREST
1242075	7917128.053	563725.045	569.917	EXC CREST
1242076	7917135.629	563731.135	569.738	EXC CREST
1242143	7917083.038	563673.78	568.523	EXC TOE
1242144	7917080.381	563672.543	570.253	EXC CREST
1242146	7917084.574	563683.776	568.585	EXC TOE
1243027	7917174.782	563438.8383	568.415	EXC TOE
2243001	7917093.444	563645.722	570.057	EXC CREST
2243002	7917095.922	563646.879	568.621	EXC TOE
2243003	7917091.347	563656.062	568.617	EXC TOE
2243004	7917088.355	563654.517	570.396	EXC CREST
2243005	7917083.775	563663.534	570.476	EXC CREST
2243007	7917087.313	563664.832	568.577	EXC TOE
2243008	7917082.48	563679.835	568.555	EXC TOE
2243009	7917081.923	563685.682	570.105	EXC CREST
2243010	7917100.027	563637.7674	568.529	
2243011	7917100.078	563637.7919	568.529	EXC TOE

Point No.	Northing	Easting	Elevation	Location
2243012	7917097.363	563635.842	569.856	EXC CREST
2243013	7917101.289	563627.395	570.221	EXC CREST
2243014	7917104.47	563628.9132	568.487	EXC TOE
2243015	7917105.476	563617.786	570.462	EXC CREST
2243016	7917109.057	563620.1936	568.486	EXC TOE
2243017	7917143.576	563548.054	568.651	EXC TOE
2243018	7917139.81	563546.197	570.844	EXC CREST
2243019	7917147.842	563538.862	568.636	EXC TOE
2243020	7917143.547	563536.539	571.058	EXC CREST
2243021	7917152.326	563529.933	568.622	EXC TOE
2243022	7917147.911	563527.738	570.947	EXC CREST
2243023	7917165.279	563503.1224	568.61	EXC TOE
2243024	7917175.707	563474.828	568.671	EXC TOE
2243025	7917177.51	563465.1597	568.681	EXC TOE
2243026	7917176.03	563445.4244	568.653	EXC TOE
2243027	7917177.064	563455.4105	568.667	EXC TOE
2243028	7917174.044	563435.887	568.665	EXC TOE
2243029	7917170.546	563426.8057	568.627	EXC TOE
2243032	7917153.039	563402.574	568.612	EXC TOE
2243033	7917146.08	563395.684	568.649	EXC TOE
2243034	7917139.434	563387.567	568.657	EXC TOE
2243035	7917143.021	563384.766	569.834	EXC CREST
2243036	7917150.376	563391.57	569.851	EXC CREST
2243037	7917157.251	563398.047	569.759	EXC CREST
2243038	7917164.735	563406.145	570.23	EXC CREST
2243039	7917171.137	563414.033	570.648	EXC CREST
2243040	7917176.972	563423.11	570.827	EXC CREST
2243041	7917181.475	563432.992	571.063	EXC CREST
2243042	7917185.237	563444.332	571.344	EXC CREST
2243043	7917186.67	563454.605	571.466	EXC CREST
2243044	7917186.68	563465.669	571.342	EXC CREST
2243045	7917183.851	563477.702	571.231	EXC CREST
2243046	7917180.116	563487.814	571.131	EXC CREST
2243047	7917176.084	563496.814	570.945	EXC CREST
2243048	7917172.269	563505.759	570.759	EXC CREST
2243049	7917167.976	563515.045	570.811	EXC CREST
2243050	7917163.283	563524.048	570.946	EXC CREST
2243051	7917158.953	563533.181	570.906	EXC CREST
2243052	7917154.519	563542.122	570.865	EXC CREST
2243053	7917150.577	563550.942	570.851	EXC CREST
2243054	7917146.726	563560.009	570.853	EXC CREST
2243055	7917141.757	563568.695	570.856	EXC CREST
2243056	7917137.576	563577.979	570.786	EXC CREST
2243057	7917133.478	563587.144	570.699	EXC CREST
2243058	7917128.647	563596.158	570.727	EXC CREST
2243059	7917124.78	563605.003	570.878	EXC CREST
2243060	7917119.58	563614.42	570.529	EXC CREST

Point No.	Northing	Easting	Elevation	Location
2243061	7917114.409	563622.669	570.174	EXC CREST
2243062	7917109.962	563631.881	570.04	EXC CREST
2243063	7917106.192	563641.113	570.279	EXC CREST
2243064	7917102.055	563649.858	570.598	EXC CREST
2243065	7917097.669	563658.926	570.709	EXC CREST
2243066	7917093.893	563667.569	570.986	EXC CREST
2243067	7917089.228	563676.788	570.589	EXC CREST
2243068	7917089.592	563679.146	570.534	EXC CREST
2243069	7917096.023	563686.035	570.704	EXC CREST
2243070	7917103.631	563692.023	570.659	EXC CREST
2243071	7917110.727	563698.972	570.624	EXC CREST
2243072	7917118.551	563705.329	570.705	EXC CREST
2243073	7917125.841	563712.471	570.476	EXC CREST
2243074	7917133.234	563719.34	570.371	EXC CREST
2243075	7917140.426	563726.086	569.856	EXC CREST
2243076	7917148.395	563732.157	569.953	EXC CREST
2243077	7917155.442	563738.566	569.66	EXC CREST
2243200	7917215.583	563795.1244	568.54691	EXC TOE
2243201	7917214.298	563793.9014	568.55704	EXC TOE
2243202	7917210.409	563790.4786	568.555	EXC TOE
2243203	7917206.585	563787.1628	568.407	EXC TOE
2243204	7917202.219	563783.1107	568.61	EXC TOE
2243205	7917197.759	563779.1755	568.5271	EXC TOE
2243206	7917194.248	563775.6902	568.53	EXC TOE
2243207	7917190.552	563772.671	568.551	EXC TOE
2243208	7917184.602	563768.195	568.55112	EXC TOE
2243209	7917180.179	563764.2868	568.582	EXC TOE
2243210	7917172.994	563758.2831	568.498	EXC TOE
2243211	7917168.116	563754.2326	568.44162	EXC TOE
2243212	7917160.037	563747.0065	568.51498	EXC TOE
2243213	7917138.022	563728.3075	568.618	EXC TOE
2243214	7917130.569	563722.3344	568.614	EXC TOE
2243215	7917115.615	563708.9966	568.655	EXC TOE
2243216	7917105.659	563700.6433	568.635	EXC TOE
2243217	7917099.983	563695.8842	568.632	EXC TOE
2243218	7917095.076	563691.7503	568.642	EXC TOE
2243219	7917088.772	563686.9148	568.63719	EXC TOE
2243220	7917085.614	563683.2946	568.59591	EXC TOE
2243221	7917083.74	563679.5925	568.576	EXC TOE
2243222	7917084.211	563674.0108	568.55495	EXC TOE
2243223	7917088.311	563665.2955	568.563	EXC TOE
2243224	7917092.842	563656.9148	568.541	EXC TOE
2243225	7917097.39	563647.3653	568.598	EXC TOE
2243226	7917101.469	563638.497	568.575	EXC TOE
2243227	7917105.623	563629.853	568.499	EXC TOE
2243228	7917110.38	563621.0612	568.544	EXC TOE
2243229	7917115.425	563612.1622	568.591	EXC TOE

Point No.	Northing	Easting	Elevation	Location
2243230	7917119.711	563603.2661	568.587	EXC TOE
2243231	7917125.656	563589.9205	568.615	EXC TOE
2243232	7917127.614	563585.076	568.596	EXC TOE
2243233	7917132.46	563573.8629	568.625	EXC TOE
2243234	7917139.569	563559.3902	568.634	EXC TOE
2243235	7917144.57	563548.5252	568.622	EXC TOE
2243236	7917148.833	563539.3405	568.605	EXC TOE
2243237	7917153.482	563530.6792	568.598	EXC TOE
2243238	7917157.874	563521.7302	568.578	EXC TOE
2243239	7917162.387	563512.7456	568.617	EXC TOE
2243240	7917165.104	563506.658	568.596	EXC TOE
2243241	7917166.532	563503.4417	568.577	EXC TOE
2243242	7917169.848	563494.1863	568.617	EXC TOE
2244001	7917129.307	563347.79	569.146	EXC CREST
2244002	7917130.061	563347.655	568.637	EXC TOE
2244003	7917131.316	563347.996	568.624	EXC CL
2244004	7917132.021	563347.893	568.649	EXC TOE
2244005	7917132.876	563348	568.976	EXC CREST
2244006	7917132.228	563338.768	569.063	EXC CREST
2244007	7917132.554	563338.645	568.606	EXC TOE
2244008	7917133.737	563338.8	568.647	EXC CL
2244009	7917134.641	563339.045	568.713	EXC TOE
2244010	7917135.659	563339.17	569.003	EXC CREST
2244011	7917135.159	563329.211	568.987	EXC CREST
2244012	7917135.569	563329.35	568.666	EXC TOE
2244013	7917136.378	563329.431	568.659	EXC CL
2244014	7917137.173	563329.733	568.625	EXC TOE
2244015	7917137.98	563329.907	568.921	EXC CREST
2244016	7917138.826	563320.152	568.607	EXC CL
2244017	7917139.371	563320.213	568.622	EXC TOE
2244018	7917140.372	563320.476	568.953	EXC CREST
2244019	7917137.8	563319.83	568.671	EXC TOE
2244020	7917136.762	563319.381	569.006	EXC CREST
2244021	7917141.889	563310.581	568.69	EXC CL
2244022	7917142.435	563310.775	568.65	EXC TOE
2244023	7917143.565	563311.1	569.06	EXC CREST
2244024	7917141.24	563310.443	568.643	EXC TOE
2244025	7917140.544	563310.334	569.033	EXC CREST
2244027	7917145.117	563301.136	568.462	EXC CL
2244028	7917145.648	563301.341	568.555	EXC TOE
2244029	7917146.655	563301.579	568.793	EXC CREST
2244030	7917143.26	563300.901	568.919	EXC CREST
2244031	7917144.508	563301.178	568.608	EXC TOE
2244032	7917147.182	563291.489	568.545	EXC CL
2244033	7917147.819	563291.448	568.526	EXC TOE
2244034	7917148.877	563291.594	568.946	EXC CREST
2244035	7917146.466	563291.094	568.553	EXC TOE

Point No.	Northing	Easting	Elevation	Location
2244036	7917145.894	563290.974	568.879	EXC CREST
2244037	7917149.368	563281.736	568.535	EXC CL
2244038	7917149.998	563281.875	568.569	EXC TOE
2244039	7917151.062	563282.135	568.845	EXC CREST
2244040	7917148.956	563281.692	568.572	EXC TOE
2244041	7917148.189	563281.607	568.974	EXC CREST
2244042	7917151.749	563271.859	568.606	EXC CL
2244043	7917152.264	563272.048	568.601	EXC TOE
2244044	7917153.28	563272.099	568.921	EXC CREST
2244045	7917150.951	563271.641	568.613	EXC TOE
2244046	7917150.414	563271.409	568.892	EXC CREST
2244047	7917154.149	563262.221	568.514	EXC CL
2244048	7917154.645	563262.274	568.505	EXC TOE
2244049	7917155.767	563262.209	568.86	EXC CREST
2244050	7917153.341	563262.014	568.538	EXC TOE
2244051	7917152.735	563262.033	568.884	EXC CREST
2244052	7917155.534	563252.501	568.631	EXC CL
2244053	7917155.914	563252.484	568.636	EXC TOE
2244054	7917156.723	563252.428	568.863	EXC CREST
2244055	7917154.86	563252.21	568.665	EXC TOE
2244056	7917153.943	563252.198	568.965	EXC CREST
2244057	7917156.125	563242.215	568.667	EXC TOE
2244058	7917157.23	563242.572	568.706	EXC TOE
2244059	7917156.755	563242.412	568.671	EXC CL
2244060	7917154.915	563242.088	569.068	EXC CREST
2244061	7917158.33	563242.429	569.103	EXC CREST
2244062	7917157.936	563232.588	568.599	EXC TOE
2244063	7917159.039	563232.767	568.672	EXC TOE
2244064	7917160.677	563233.019	569.16	EXC CREST
2244065	7917156.315	563232.382	569.284	EXC CREST
2244066	7917158.471	563232.792	568.684	EXC CL
2244067	7917160.759	563223.141	568.634	EXC TOE
2244068	7917161.891	563223.261	568.668	EXC TOE
2244069	7917163.257	563223.594	569.336	EXC CREST
2244070	7917161.332	563223.127	568.644	EXC CL
2244071	7917158.318	563222.619	569.895	EXC CREST
2244072	7917164.121	563213.479	568.78	EXC TOE
2244073	7917163.229	563213.316	568.803	EXC TOE
2244074	7917163.767	563213.45	568.768	EXC CL
2244075	7917165.804	563214.043	569.565	EXC CREST
2244076	7917160.253	563212.738	570.049	EXC CREST
2244077	7917165.468	563203.624	568.828	EXC CL
2244078	7917164.517	563203.636	568.848	EXC TOE
2244079	7917165.86	563203.616	568.828	EXC TOE
2244080	7917167.871	563203.964	569.704	EXC CREST
2244081	7917161.418	563202.867	570.173	EXC CREST
2244082	7917162.433	563193.358	570.103	EXC CREST

Point No.	Northing	Easting	Elevation	Location
2244083	7917165.372	563193.54	568.771	EXC TOE
2244084	7917166.867	563193.615	568.843	EXC TOE
2244085	7917166.436	563193.634	568.77	EXC CL
2244086	7917168.877	563193.857	569.587	EXC CREST
2244087	7917168.872	563183.411	569.61	EXC CREST
2244088	7917166.98	563183.6	568.875	EXC TOE
2244089	7917165.544	563183.81	568.88	EXC TOE
2244090	7917166.422	563183.662	568.791	EXC CL
2244091	7917163.42	563184.004	569.999	EXC CREST
2244092	7917162.165	563174.211	569.851	EXC CREST
2244093	7917164.214	563173.926	568.906	EXC TOE
2244094	7917165.694	563173.662	569.043	EXC TOE
2244095	7917165.17	563173.766	568.9	EXC CL
2244096	7917166.817	563173.504	569.492	EXC CREST
2244097	7917164.53	563163.476	569.722	EXC CREST
2244098	7917162.768	563164	568.818	EXC TOE
2244099	7917161.55	563164.506	568.793	EXC TOE
2244100	7917162.239	563164.394	568.678	EXC CL
2244101	7917158.918	563165.309	570.019	EXC CREST
2244102	7917154.845	563157.21	570.384	EXC CREST
2244103	7917157.392	563155.813	568.967	EXC TOE
2244104	7917158.851	563154.876	568.945	EXC TOE
2244105	7917158.507	563155.119	568.839	EXC CL
2244106	7917160.709	563153.599	569.89	EXC CREST
2245002	7916864.019	562895.289	570.934	EXC CREST
2245004	7916863.412	562896.9	570.208	EXC TOE
2245006	7916862.639	562897.933	570.06	EXC CL
2245007	7916861.709	562898.504	570.093	EXC TOE
2245008	7916861.122	562899.439	570.67	EXC CREST
2245009	7916868.235	562906.229	570.856	EXC CREST
2245010	7916869.537	562904.758	570.131	EXC TOE
2245011	7916870.431	562903.507	570.181	EXC CL
2245012	7916870.86	562902.485	570.225	EXC TOE
2245013	7916873.157	562900.042	570.941	EXC CREST
2245014	7916880.902	562904.449	570.807	EXC CREST
2245015	7916880.917	562904.451	570.812	EXC CREST
2245016	7916879.938	562906.763	570.249	EXC TOE
2245017	7916879.373	562908.015	570.158	EXC
2245018	7916878.959	562908.787	570.188	EXC CL
2245019	7916878.112	562910.057	570.164	EXC TOE
2245020	7916877.642	562911.734	570.696	EXC CREST
2245021	7916886.405	562916.745	570.832	EXC CREST
2245022	7916887.115	562914.699	570.202	EXC
2245023	7916887.611	562913.664	570.081	EXC CL
2245024	7916888.25	562913.074	570.189	EXC CL
2245025	7916888.26	562913.067	570.189	EXC TOE
2245026	7916889.382	562910.321	570.742	EXC CREST

Point No.	Northing	Easting	Elevation	Location
2245027	7916897.83	562913.631	570.781	EXC CREST
2245028	7916897.09	562915.901	570.075	EXC TOE
2245029	7916896.95	562917.176	570.055	EXC CL
2245030	7916896.618	562917.567	569.847	EXC TOE
2245031	7916896.273	562918.687	570.3	EXC
2245032	7916896.08	562920.627	570.878	EXC CREST
2245033	7916907.204	562925	571.148	EXC CREST
2245034	7916908.784	562922.256	570.051	EXC
2245035	7916909.216	562920.946	570.007	EXC CL
2245036	7916909.881	562919.975	570.051	EXC TOE
2245037	7916909.847	562919.936	570.056	EXC TOE
2245038	7916909.86	562918.334	570.597	EXC CREST
2245040	7916918.278	562920.024	570.62	EXC CREST
2245041	7916917.551	562922.103	569.992	EXC TOE
2245042	7916917.122	562923.118	569.98	EXC CL
2245043	7916916.671	562924.213	569.986	EXC TOE
2245044	7916916.175	562926.737	570.826	EXC CREST
2245045	7916925.566	562929.335	570.833	EXC CREST
2245046	7916926.539	562927.275	569.959	EXC TOE
2245047	7916926.854	562926.929	569.928	EXC CL
2245048	7916927.416	562926.163	570.041	EXC TOE
2245049	7916927.789	562924.304	570.352	EXC CREST
2245050	7916937.832	562926.047	570.75	EXC CREST
2245051	7916937.747	562928.909	569.923	EXC TOE
2245052	7916937.386	562929.294	569.924	EXC CL
2245053	7916937.207	562930.047	569.972	EXC TOE
2245054	7916935.963	562932.575	570.881	EXC CREST
2245055	7916943.305	562933.893	570.59	EXC CREST
2245056	7916942.68	562935.122	570.917	OG CREST
2245059	7916944.279	562932.142	569.889	EXC TOE
2245060	7916944.44	562931.632	569.882	EXC CL
2245061	7916944.75	562931.085	569.914	EXC TOE
2245062	7916946.058	562929.044	570.562	EXC CREST
2245063	7916955.154	562932.464	570.222	EXC CREST
2245064	7916954.61	562934.194	569.855	EXC TOE
2245065	7916954.363	562934.679	569.809	EXC CL
2245066	7916954.139	562935.586	569.827	EXC TOE
2245067	7916953.495	562937.367	570.296	EXC CREST
2245068	7916953.289	562938.389	570.72	OG CREST
2245069	7916963.388	562940.968	570.513	EXC CREST
2245070	7916963.782	562939.537	570.224	EXC CREST
2245071	7916964.632	562938.173	569.803	EXC TOE
2245072	7916964.759	562937.693	569.794	EXC CL
2245073	7916965.054	562937.276	569.883	EXC TOE
2245074	7916966.287	562934.86	570.463	EXC CREST
2245075	7916970.324	562936.778	570.372	EXC CREST
2245076	7916969.164	562939.123	569.701	EXC TOE

Point No.	Northing	Easting	Elevation	Location
2245077	7916969.107	562939.492	569.728	EXC CL
2245078	7916968.924	562940.151	569.795	EXC TOE
2245079	7916968.064	562941.35	570.183	EXC CREST
2245080	7916967.792	562942.612	570.538	OG CREST
2245081	7916982.107	562946.869	570.216	EXC CREST
2245082	7916982.918	562944.934	569.647	EXC TOE
2245083	7916983.216	562944.487	569.64	EXC CL
2245084	7916983.765	562943.799	569.65	EXC TOE
2245085	7916984.888	562941.88	569.917	EXC CREST
2245086	7916993.104	562946.472	569.962	EXC CREST
2245087	7916992.8	562947.226	569.687	EXC TOE
2245088	7916992.566	562947.829	569.696	EXC CL
2245089	7916992.411	562948.707	569.679	EXC TOE
2245090	7916991.946	562949.687	569.954	EXC CREST
2245091	7917000.543	562953.689	569.919	EXC CREST
2245092	7917001.385	562952.368	569.617	EXC TOE
2245093	7917001.587	562951.765	569.67	EXC CL
2245094	7917001.661	562951.403	569.66	EXC TOE
2245095	7917002.196	562950.382	569.879	EXC CREST
2245096	7917010.941	562954.997	569.857	EXC CREST
2245097	7917010.071	562956.178	569.55	EXC TOE
2245098	7917009.909	562956.708	569.562	EXC CL
2245099	7917009.37	562957.597	569.552	EXC TOE
2245100	7917008.368	562958.702	569.82	EXC CREST
2245101	7917017.111	562964.533	569.971	EXC CREST
2245102	7917018.142	562963.442	569.518	EXC TOE
2245103	7917018.555	562962.938	569.516	EXC CL
2245104	7917018.996	562962.482	569.567	EXC TOE
2245105	7917019.897	562961.052	569.911	EXC CREST
2245106	7917027.979	562966.078	569.918	EXC CREST
2245107	7917026.775	562967.54	569.569	EXC TOE
2245108	7917026.062	562968.395	569.545	EXC CL
2245109	7917025.498	562968.987	569.523	EXC TOE
2245110	7917024.879	562970.02	569.909	EXC CREST
2245111	7917032.534	562976.248	570.115	EXC CREST
2245112	7917031.099	562977.447	570.555	OG CREST
2245113	7917036.48	562985.926	571.219	OG CREST
2245114	7917038.137	562984.835	570.774	EXC CREST
2245115	7917044.058	562992.945	570.879	EXC CREST
2245116	7917042.569	562994.11	571.556	OG CREST
2245117	7917047.053	563002.374	571.675	OG CREST
2245118	7917049.014	563001.186	570.958	EXC CREST
2245119	7917054.67	563008.335	570.306	EXC CREST
2245120	7917051.869	563009.77	571.433	OG CREST
2245121	7917057.663	563018.589	570.511	OG CREST
2245122	7917060.985	563016.632	569.796	EXC CREST
2245123	7917066.894	563024.489	569.661	EXC CREST

Point No.	Northing	Easting	Elevation	Location
2245124	7917064.28	563026.145	570.221	OG CREST
2245125	7917072.253	563033.092	569.726	EXC CREST
2245126	7917070.961	563034.049	569.996	OG CREST
2245127	7917072.369	563031.437	569.302	EXC TOE
2245128	7917075.314	563030.759	569.939	EXC CREST
2245129	7917069.85	563022.445	569.806	EXC CREST
2245130	7917064.795	563013.614	569.905	EXC CREST
2245131	7917059.865	563005.213	570.094	EXC CREST
2245132	7917054.52	562996.74	570.29	EXC CREST
2245133	7917048.424	562988.304	570.229	EXC CREST
2245134	7917042.666	562980.256	570.311	EXC CREST
2245135	7917035.769	562972.396	570.053	EXC CREST
2245136	7917034.532	562973.661	569.551	EXC TOE
2245137	7917033.746	562974.369	569.504	EXC CL
2245138	7917032.935	562974.852	569.506	EXC TOE
2245139	7917039.663	562982.775	569.612	EXC TOE
2245140	7917040.414	562982.525	569.51	EXC CL
2245141	7917041.099	562981.712	569.532	EXC TOE
2245142	7917047.031	562990.132	569.532	EXC TOE
2245143	7917046.135	562990.638	569.53	EXC CL
2245144	7917045.394	562991.235	569.558	EXC TOE
3245588	7917153.384	563146.222	568.837	EXC TOE
3245589	7917152.598	563146.87	568.977	EXC TOE
3245590	7917152.921	563146.536	568.948	EXC CL
3245591	7917149.533	563148.909	570.296	EXC CREST
3245592	7917156.186	563144.05	570.138	EXC CREST
3245593	7917151.136	563136.416	569.852	EXC CREST
3245594	7917147.985	563138.397	568.602	EXC TOE
3245595	7917147.237	563138.797	568.718	EXC TOE
3245596	7917147.638	563138.645	568.698	EXC CL
3245597	7917144.43	563140.468	570.058	EXC CREST
3245598	7917139.543	563131.63	569.75	EXC CREST
3245599	7917141.541	563130.412	568.857	EXC TOE
3245600	7917142.582	563129.955	568.88	EXC TOE
3245601	7917142.113	563130.192	568.703	EXC CL
3245602	7917144.634	563128.196	569.756	EXC CREST
3245603	7917138.254	563119.997	569.549	EXC CREST
3245604	7917136.979	563121.114	569.167	EXC TOE
3245605	7917136.207	563121.6	569.061	EXC TOE
3245606	7917136.592	563121.218	569.112	EXC CL
3245607	7917134.197	563122.833	569.463	EXC CREST
3245608	7917128.465	563114.046	569.495	EXC CREST
3245609	7917130.518	563113.009	568.929	EXC TOE
3245610	7917131.388	563112.468	569.06	EXC TOE
3245611	7917130.965	563112.779	569.078	EXC CL
3245612	7917133.086	563111.552	569.359	EXC CREST
3245613	7917127.461	563103.301	569.447	EXC CREST

Point No.	Northing	Easting	Elevation	Location
3245614	7917126.319	563104.032	569.09	EXC TOE
3245615	7917125.298	563104.581	569.082	EXC TOE
3245616	7917125.72	563104.38	569.061	EXC CL
3245617	7917123.942	563105.413	569.597	EXC CREST
3245618	7917118.323	563097.515	569.591	EXC CREST
3245619	7917119.513	563096.994	569.144	EXC TOE
3245620	7917120.48	563096.395	569.222	EXC TOE
3245621	7917119.962	563096.688	569.152	EXC CL
3245622	7917121.806	563095.58	569.453	EXC CREST
3245623	7917116.569	563087.787	569.738	EXC CREST
3245624	7917114.821	563088.877	569.21	EXC TOE
3245625	7917113.778	563089.509	569.096	EXC TOE
3245626	7917114.244	563089.232	569.136	EXC CL
3245627	7917112.292	563090.279	569.752	EXC CREST
3245628	7917106.383	563082.875	570.042	EXC CREST
3245629	7917108.28	563080.981	569.112	EXC TOE
3245630	7917109.335	563080.203	569.309	EXC TOE
3245631	7917108.889	563080.773	569.279	EXC TOE
3245632	7917111.206	563079.018	570.107	EXC CREST
3245633	7917105.079	563070.448	570.276	EXC CREST
3245634	7917103.54	563071.742	569.267	EXC TOE
3245635	7917102.12	563072.801	569.183	EXC TOE
3245636	7917102.573	563072.329	569.246	EXC CL
3245637	7917099.948	563074.057	570.075	EXC CREST
3245638	7917093.561	563066.853	570.339	EXC CREST
3245639	7917096.049	563064.756	568.995	EXC TOE
3245640	7917097.074	563064.117	568.907	EXC TOE
3245641	7917096.806	563064.428	568.878	EXC CL
3245642	7917099.948	563062.803	570.291	EXC CREST
3245643	7917091.499	563056.076	569.019	EXC TOE
3245644	7917090.287	563057.009	569.036	EXC TOE
3245645	7917090.69	563056.517	569.04	EXC CL
3245646	7917088.336	563057.848	569.895	EXC CREST
3245647	7917093.516	563053.366	570.043	EXC CREST
3245648	7917087.153	563047.132	569.921	EXC CREST
3245649	7917085.196	563048.263	569.165	EXC CL
3245650	7917085.645	563047.694	569.189	EXC TOE
3245651	7917084.467	563048.482	569.133	EXC TOE
3245652	7917082.893	563049.631	569.757	EXC CREST
3245653	7917081.129	563039.027	569.75	EXC CREST
3245654	7917080.017	563039.899	569.294	EXC TOE
3245655	7917078.821	563041.066	569.214	EXC TOE
3245656	7917079.359	563040.391	569.093	EXC CL
3245657	7917077.051	563041.899	569.82	EXC CREST
3245658	7917073.687	563032.052	569.28	EXC TOE
3245659	7917073.237	563032.194	569.275	EXC TOE
3245660	7917074.362	563031.589	569.242	EXC TOE

Point No.	Northing	Easting	Elevation	Location
3245661	7917068.998	563023.048	569.561	EXC TOE
3245662	7917067.785	563023.712	569.307	EXC TOE
3245663	7917068.228	563023.292	569.281	EXC CL
3245664	7917063.212	563015.077	569.399	EXC CL
3245665	7917062.637	563015.623	569.461	EXC TOE
3245666	7917063.548	563014.791	569.444	EXC TOE
3245667	7917057.987	563006.473	569.4	EXC TOE
3245668	7917056.832	563007.183	569.359	EXC TOE
3245669	7917057.226	563006.819	569.23	EXC CL
3245670	7917052.548	562998.049	569.541	EXC TOE
3245671	7917051.192	562999.015	569.417	EXC TOE
3245672	7917051.57	562998.498	569.203	EXC CL

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Point No.	Northing	Easting	Elevation	Location
1	7917273.096	563848.892	567.365	DL
2	7917266.116	563841.497	567.586	DL
3	7917273.096	563848.892	567.365	DL
4	7917266.116	563841.497	567.586	DL
5	7917273.096	563848.892	567.365	DL
6	7917266.116	563841.497	567.586	DL
7	7917259.231	563832.94	567.679	DL
8	7917247.85	563823.85	567.894	DL
9	7917259.231	563832.94	567.679	DL
10	7917247.85	563823.85	567.894	DL
11	7917259.231	563832.94	567.679	DL
12	7917247.85	563823.85	567.894	DL
13	7917240.905	563816.293	568.235	DL
14	7917240.905	563816.293	568.235	DL
15	7917240.905	563816.293	568.235	DL
16	7917277.742	563854.537	567.23	LAKE ELE
17	7917277.742	563854.537	567.23	LAKE ELE
18	7917277.742	563854.537	567.23	LAKE ELE
1138916	7916804.823	562878.392	576.387	SWC
1138917	7916799.805	562882.725	576.47	SWC
1138918	7916796.941	562875.069	575.902	SWT
1138925	7916778.94	562848.667	577.008	CRST
1138926	7916782.4	562850.598	576.955	CRST
1242078	7917161.528	563749.898	568.818	RR TOE
1242079	7917162.368	563748.639	568.81	RR TOE
1242082	7917168.58	563754.44	568.828	RR TOE
1242083	7917168.004	563755.385	568.831	RR TOE
1242086	7917175.775	563761.839	568.842	RR TOE
1242087	7917176.401	563760.963	568.827	RR TOE
1242090	7917184.601	563767.879	568.79	RR TOE
1242091	7917184.147	563769.055	568.752	RR TOE
1242094	7917191.55	563774.508	568.779	RR TOE
1242095	7917192.251	563773.725	568.756	RR TOE
1242098	7917199.6	563780.471	568.728	RR TOE
1242099	7917198.872	563781.253	568.737	RR TOE
1242103	7917206.337	563788.092	568.735	RR TOE
1242104	7917207.188	563787.601	568.737	RR TOE
1242107	7917214.304	563794.075	568.711	RR TOE
1242108	7917213.133	563794.852	568.691	RR TOE
1242111	7917221.566	563802.241	568.67	RR TOE
1242112	7917222.594	563801.742	568.639	RR TOE
1242114	7917230.937	563808.053	568.714	RR CREST
1242115	7917229.992	563808.797	568.58	RR TOE
1242116	7917229.221	563809.307	568.56	RR TOE
1242117	7917228.76	563809.653	568.803	RR CREST

Point No.	Northing	Easting	Elevation	Location
1242119	7917240.905	563816.293	568.235	
1242120	7917247.85	563823.85	567.894	
1242121	7917259.231	563832.94	567.679	
1242122	7917266.116	563841.497	567.586	
1242123	7917273.096	563848.892	567.365	
1242124	7917277.742	563854.537	567.23	
1244848	7916944.982	562930.774	570.187	RR TOE
1244849	7916944.654	562931.478	570.123	CL
1244850	7916944.35	562932.275	570.134	RR TOE
1244852	7916943.497	562934.686	570.578	OG
1244853	7916933.713	562931.774	570.733	OG
1244855	7916934.16	562929.483	570.199	RR TOE
1244856	7916934.299	562928.761	570.213	CL
1244857	7916934.667	562927.708	570.17	RR TOE
1244860	7916963.671	562937.507	569.985	RR TOE
1244861	7916963.208	562938.647	570.096	RR TOE
1244862	7916956.604	562938.862	570.448	EG
1244865	7916956.595	562936.54	570.134	RR TOE
1244866	7916956.711	562935.145	570.068	RR CREST
1244867	7916956.691	562935.145	570.065	RR TOE
1244871	7916935.658	562928.07	570.256	RR TOE
1244872	7916935.451	562928.825	570.187	CL
1244874	7916934.857	562930.038	570.198	RR TOE
1244876	7916934.356	562931.923	570.793	EG
1244877	7916924.406	562929.085	570.721	EG
1244879	7916924.578	562927.232	570.272	RR TOE
1244880	7916924.576	562926.388	570.279	RR CL
1244881	7916924.568	562925.571	570.27	RR TOE
1244884	7916915.966	562922.278	570.295	RR TOE
1244885	7916915.596	562923.182	570.271	RR CL
1244886	7916915.277	562924.356	570.303	RR TOE
1244889	7916905.733	562922.642	570.642	EG
1244891	7916906.349	562921.348	570.287	RR TOE
1244892	7916906.551	562920.188	570.271	RR CL
1244893	7916907.024	562919.239	570.301	RR TOE
1244896	7916897.614	562916.817	570.335	RR TOE
1244897	7916897.17	562917.552	570.299	RR CL
1244898	7916896.429	562918.288	570.272	RR TOE
1244900	7916895.767	562920.196	570.805	EG
1244903	7916886.871	562914.631	570.384	RR TOE
1244904	7916887.054	562913.192	570.35	RR CL
1244905	7916886.839	562912.522	570.377	RR TOE
1244908	7916879.718	562909.16	570.477	RR TOE
1244909	7916879.535	562909.9	570.495	RR CL
1244910	7916879.253	562911.091	570.477	RR TOE
1248003	7916873.224	562905.151	570.519	RR TOE
1248004	7916872.469	562906.817	570.532	RR TOE

Point No.	Northing	Easting	Elevation	Location
1248005	7916870.88	562908.673	570.823	RR CREST
1248006	7916870.745	562908.948	570.878	OG
1248011	7916985.05	562943.425	570.327	RR CREST
1248012	7916977.111	562940.452	570.309	RR CREST
1248013	7916973.376	562938.504	570.382	RR CREST
1248014	7916974.619	562941.114	570.023	RR TOE
1248015	7916974.444	562942.521	569.997	RR TOE
1248016	7916984.475	562944.833	570.039	RR TOE
1248017	7916984.005	562945.801	569.985	RR TOE
1248018	7916991.221	562947.491	569.919	RR TOE
1248019	7916991.097	562948.278	569.936	RR TOE
1248020	7917002.737	562952.004	569.936	RR TOE
1248021	7917002.205	562953.743	569.912	RR TOE
1248022	7917013.678	562957.392	569.901	RR TOE
1248023	7917012.846	562959.693	569.884	RR TOE
1248024	7917019.826	562965.02	569.835	RR TOE
1248025	7917021.027	562963.352	569.892	RR TOE
1248026	7917028.317	562967.873	569.821	RR TOE
1248027	7917027.445	562970.163	569.837	RR TOE
1248028	7917033.206	562974.805	569.812	RR TOE
1248029	7917034.621	562973.415	569.8	RR TOE
1248030	7917041.543	562982.119	569.775	RR TOE
1248031	7917041.082	562984.404	569.875	RR TOE
1248032	7917047.975	562991.536	569.78	RR TOE
1248033	7917047.266	562992.589	569.827	RR TOE
1248034	7917053.12	562999.291	569.72	RR TOE
1248035	7917051.625	562999.935	569.839	RR TOE
1248036	7917057.726	563007.83	569.704	RR TOE
1248037	7917056.325	563007.993	569.864	RR TOE
1248038	7917064.028	563015.81	569.642	RR TOE
1248039	7917062.973	563017.139	569.664	RR TOE
1248040	7917068.406	563023.284	569.583	RR TOE
1248041	7917067.48	563024.246	569.55	RR TOE
1248042	7917073.955	563031.79	569.534	RR TOE
1248043	7917072.983	563032.484	569.533	RR TOE
1248044	7917080.014	563040.363	569.397	RR TOE
1248045	7917078.848	563041.222	569.395	RR TOE
1248046	7917085.741	563048.738	569.349	RR TOE
1248047	7917084.795	563049.568	569.351	RR TOE
1248048	7917090.512	563054.431	569.319	RR TOE
1248049	7917088.42	563054.969	569.362	RR TOE
1248050	7917159.686	563156.625	569.102	RR TOE
1248051	7917158.269	563157.174	569.091	RR TOE
1248052	7917161.474	563164.46	569.125	RR TOE
1248053	7917162.769	563164.305	569.079	RR TOE
1248054	7917165.264	563173.316	569.083	RR TOE
1248055	7917164.292	563173.612	569.092	RR TOE

Point No.	Northing	Easting	Elevation	Location
1248056	7917166.792	563183.522	569.038	RR TOE
1248057	7917165.671	563183.444	569.042	RR TOE
1248058	7917166.721	563193.836	568.961	RR TOE
1248059	7917165.731	563193.62	569	RR TOE
1248060	7917165.8	563203.946	568.951	RR TOE
1248061	7917164.708	563203.885	568.986	RR TOE
1248062	7917164.124	563213.778	568.929	RR TOE
1248063	7917162.937	563213.657	568.959	RR TOE
1248064	7917161.798	563223.183	568.874	RR TOE
1248065	7917160.8	563222.87	568.929	RR TOE
1248066	7917158.94	563233.022	568.865	RR TOE
1248067	7917157.736	563233.042	568.897	RR TOE
1248068	7917157.079	563242.307	568.858	RR TOE
1248069	7917156.136	563241.986	568.857	RR TOE
1248070	7917155.97	563252.39	568.837	RR TOE
1248071	7917154.895	563252.513	568.847	RR TOE
1248072	7917154.604	563262.476	568.832	RR TOE
1248073	7917153.342	563262.106	568.846	RR TOE
1248074	7917152.264	563272.287	568.84	RR TOE
1248075	7917151.049	563272.05	568.829	RR TOE
1248076	7917150.591	563280.69	568.847	RR TOE
1248077	7917149.521	563280.314	568.829	RR TOE
1248078	7917147.739	563293.161	568.836	RR TOE
1248079	7917146.397	563292.8	568.842	RR TOE
1248080	7917145.752	563301.868	568.864	RR TOE
1248081	7917144.124	563302.075	568.853	RR TOE
1248082	7917142.301	563311.299	568.848	RR TOE
1248083	7917141.222	563311.09	568.839	RR TOE
1248084	7917139.89	563318.856	568.839	RR TOE
1248085	7917138.63	563318.299	568.822	RR TOE
1248086	7917136.645	563330.529	568.834	RR TOE
1248087	7917135.716	563330.262	568.818	RR TOE
1248088	7917134.717	563338.982	568.832	RR TOE
1248089	7917133.172	563338.447	568.855	RR TOE
1248090	7917132.833	563343.94	568.827	RR TOE
1248091	7917131.752	563343.671	568.823	RR TOE
1248092	7917131.829	563349.686	568.85	RR TOE
1248093	7917130.886	563349.529	568.831	RR TOE
1248094	7917131.549	563359.7	568.847	RR TOE
1248095	7917130.704	563359.764	568.829	RR TOE
1248096	7917132.588	563371.016	568.836	RR TOE
1248097	7917133.668	563370.678	568.85	RR TOE
1248098	7917135.992	563377.933	568.82	RR TOE
1248099	7917134.916	563377.612	568.847	RR TOE
1248100	7917139.558	563388.034	568.856	RR TOE
1248101	7917140.746	563387.363	568.835	RR TOE
1248102	7917147.072	563395.135	568.866	RR TOE

Point No.	Northing	Easting	Elevation	Location
1248103	7917146.549	563395.962	568.861	RR TOE
1248104	7917154.312	563402.189	568.848	RR TOE
1248105	7917153.702	563402.843	568.846	RR TOE
1248106	7917160.646	563410.152	568.841	RR TOE
1248107	7917159.934	563410.759	568.847	RR TOE
1248108	7917166.401	563418.587	568.838	RR TOE
1248109	7917165.723	563419.101	568.841	RR TOE
1248110	7917171.945	563426.966	568.852	RR TOE
1248111	7917170.87	563427.441	568.848	RR TOE
1248112	7917175.372	563436.387	568.838	RR TOE
1248113	7917174.31	563437.026	568.859	RR TOE
1248114	7917177.051	563446.126	568.846	RR TOE
1248115	7917176.147	563446.251	568.817	RR TOE
1248116	7917178.004	563455.555	568.837	RR TOE
1248117	7917177.086	563455.85	568.843	RR TOE
1248118	7917178.449	563464.921	568.827	RR TOE
1248119	7917177.475	563465.234	568.831	RR TOE
1248120	7917176.672	563476.202	568.854	RR TOE
1248121	7917175.388	563475.546	568.854	RR TOE
1248122	7917173.012	563485.433	568.864	RR TOE
1248123	7917172.024	563485.279	568.844	RR TOE
1248124	7917169.562	563495.024	568.844	RR TOE
1248125	7917168.434	563494.906	568.815	RR TOE
1248126	7917166.261	563504.317	568.826	RR TOE
1248127	7917164.97	563504.257	568.845	RR TOE
1248128	7917162.091	563513.57	568.823	RR TOE
1248129	7917160.838	563512.952	568.853	RR TOE
1248130	7917157.606	563522.357	568.859	RR TOE
1248131	7917156.106	563522.29	568.851	RR TOE
1248132	7917153.221	563531.484	568.835	RR TOE
1248133	7917151.76	563531.117	568.847	RR TOE
1248134	7917148.665	563540.109	568.848	RR TOE
1248135	7917147.436	563539.601	568.818	RR TOE
1248136	7917144.235	563549.355	568.853	RR TOE
1248137	7917143.009	563549.126	568.844	RR TOE
1248138	7917140.778	563556.814	568.83	RR TOE
1248139	7917139.324	563555.907	568.851	RR TOE
1248140	7917136.145	563567.218	568.853	RR TOE
1248141	7917134.824	563566.987	568.822	RR TOE
1248142	7917132.144	563574.033	568.852	RR TOE
1248143	7917131.513	563573.499	568.822	RR TOE
1248144	7917127.709	563585.291	568.835	RR TOE
1248145	7917126.86	563584.686	568.833	RR TOE
1248146	7917123.514	563595.152	568.834	RR TOE
1248147	7917121.916	563594.534	568.851	RR TOE
1248148	7917119.596	563603.778	568.843	RR TOE
1248149	7917117.922	563602.907	568.837	RR TOE

Point No.	Northing	Easting	Elevation	Location
1248150	7917115.193	563613.044	568.856	RR TOE
1248151	7917113.346	563612.306	568.852	RR TOE
1248152	7917108.844	563620.757	568.864	RR TOE
1248153	7917110.115	563621.683	568.827	RR TOE
1248154	7917104.423	563632.622	568.849	RR TOE
1248155	7917102.881	563632.147	568.84	RR TOE
1248156	7917100.172	563641.75	568.837	RR TOE
1248157	7917098.669	563641.267	568.845	RR TOE
1248158	7917096.412	563649.999	568.833	RR TOE
1248159	7917094.659	563649.543	568.807	RR TOE
1248160	7917092.376	563658.161	568.851	RR TOE
1248161	7917090.783	563657.386	568.842	RR TOE
1248162	7917088.189	563665.589	568.853	RR TOE
1248163	7917087.257	563665.163	568.826	RR TOE
1248164	7917084.522	563674.014	568.837	RR TOE
1248165	7917082.938	563673.735	568.868	RR TOE
1248166	7917084.026	563678.647	568.846	RR TOE
1248167	7917082.582	563678.733	568.827	RR TOE
1248168	7917082.402	563679.902	568.844	RR TOE
1248169	7917084.14	563680.345	568.824	RR TOE
1248170	7917085.692	563683.055	568.831	RR TOE
1248171	7917084.903	563684.553	568.833	RR TOE
1248172	7917087.578	563687.194	568.829	RR TOE
1248173	7917088.845	563686.25	568.824	RR TOE
1248174	7917093.471	563690.194	568.848	RR TOE
1248175	7917092.812	563691.745	568.83	RR TOE
1248176	7917100.84	563696.414	568.853	RR TOE
1248177	7917100.123	563697.854	568.831	RR TOE
1248178	7917108.614	563702.848	568.832	RR TOE
1248179	7917107.384	563703.488	568.842	RR TOE
1248180	7917116.365	563709.452	568.841	RR TOE
1248181	7917115.196	563710.608	568.841	RR TOE
1248182	7917123.04	563715.627	568.854	RR TOE
1248183	7917122.777	563716.775	568.883	RR TOE
1248184	7917130.654	563721.968	568.839	RR TOE
1248185	7917130.112	563723.045	568.853	RR TOE
1248186	7917138.109	563728.04	568.829	RR TOE
1248187	7917137.313	563729.285	568.848	RR TOE
1248188	7917145.978	563734.601	568.856	RR TOE
1248189	7917144.963	563735.447	568.815	RR TOE
1248190	7917154.32	563741.793	568.849	RR TOE
1248191	7917153.113	563742.7	568.842	RR TOE
1248192	7917163.627	563749.886	568.797	RR TOE
1250001	7916874.154	562902.959	571.183	RR CREST
1250002	7916873.495	562904.704	570.587	RR TOE
1262002	7916787.209	562859.986	576.615	RR TOE
1262003	7916790.575	562861.654	576.18	RR TOE

Point No.	Northing	Easting	Elevation	Location
1262004	7916791.154	562860.555	576.697	RR CREST
1262005	7916791.47	562859.721	576.718	RR CREST
1262006	7916789.092	562858.787	576.911	RR CREST
1262007	7916788.701	562859.58	576.884	RR CREST
1262008	7916794.113	562861.954	576.494	RR CREST
1262009	7916794.301	562861.183	576.535	RR CREST
1262010	7916793.694	562863.447	575.902	RR TOE
1262011	7916795.957	562864.663	575.589	RR TOE
1262012	7916796.728	562863.485	576.296	RR CREST
1262013	7916797.085	562862.174	576.191	RR CREST
1262014	7916800.884	562864.47	575.916	RR CREST
1262015	7916800.691	562863.27	575.889	RR CREST
1262016	7916800.702	562866.36	575.121	RR TOE
1262017	7916804.816	562866.526	574.59	RR TOE
1262018	7916804.792	562866.533	574.576	RR TOE
1262019	7916804.888	562864.833	575.153	RR CREST
1262020	7916805.086	562863.859	575.188	RR CREST
1262021	7916830.104	562872.972	570.95	RR TOE
1262022	7916830.512	562871.961	571.712	RR CREST
1262023	7916830.754	562870.871	571.768	RR CREST
1262024	7916838.128	562875.166	571.412	RR CREST
1262025	7916838.635	562874.068	571.475	RR CREST
1262026	7916837.557	562876.221	570.941	RR TOE
1262027	7916849.425	562880.975	571.309	RR CREST
1262028	7916849.03	562881.871	571.347	RR CREST
1262029	7916848.29	562882.733	570.781	RR TOE
1262030	7916850.929	562881.846	571.316	RR CREST
1262031	7916850.502	562883.008	571.349	RR CREST
1262032	7916853.629	562884.688	571.235	RR CREST
1262033	7916852.772	562885.278	571.164	RR CREST
1262034	7916851.863	562886.389	570.775	RR TOE
1262065	7916853.656	562883.036	570.836	RR TOE
1262066	7916849.857	562888.417	570.806	DT
1262067	7916848.919	562889.721	571.159	DC
1262068	7916840.161	562880.495	571.161	DC
1262069	7916840.563	562879.54	570.839	DT
1262070	7916841.148	562878.157	570.868	DT
1262071	7916850.224	562879.993	570.705	RR TOE
1262072	7916843.709	562875.912	570.85	RR TOE
1262073	7916830.065	562876.881	571.709	DC
1262074	7916830.278	562875.39	571.103	DT
1262075	7916830.908	562874.265	570.958	D
1262076	7916832.32	562870.61	571.281	RR TOE
1262077	7916810.53	562864.599	574.07	RR TOE
1262078	7916809.853	562868.278	573.407	DT
1262079	7916809.524	562869.814	573.749	DT
1262080	7916808.95	562871.95	574.4	DC

Point No.	Northing	Easting	Elevation	Location
1262081	7916808.949	562871.943	574.403	DC
1262082	7916805.715	562871.99	575.472	DC
1262083	7916803.55	562874.125	575.849	DC
1262084	7916802.556	562873.537	575.573	DT
1262085	7916802.952	562871.474	575.21	DT
1262086	7916805.379	562870.162	574.559	DT
1262087	7916805.137	562868.129	574.355	DT
1262088	7916805.138	562868.104	574.335	DT
1262089	7916801.232	562871.687	575.399	DT
1262090	7916795.369	562876.299	575.985	DT
1262091	7916793.655	562877.805	576.16	LINER
1262092	7916788.833	562872.147	576.215	LINER
1262093	7916788.827	562872.162	576.2	LINER
1262094	7916791.531	562868.793	575.971	D
1262095	7916793.398	562867.342	575.817	D
1262096	7916795.282	562865.178	575.626	D
1262097	7916782.874	562861.434	576.761	DC
1262098	7916787.441	562859.126	576.675	DC
1262099	7916789.644	562858.39	576.498	RR TOE
1262100	7916798.655	562861.68	575.472	RR TOE
1262101	7916803.579	562862.586	575.072	RR TOE
1262102	7916803.483	562858.776	574.867	RAMP
1262103	7916799.654	562857.855	575.35	RAMP
1262104	7916787.375	562853.715	576.701	RAMP
1262105	7916782.676	562851.53	576.954	RAMP
2115001	7916698.028	562857.623	575.608	FG
2115002	7916699.225	562849.92	575.354	FG
2115003	7916709.438	562850.04	575.06	FG
2115004	7916719.861	562849.911	574.742	FG
2115005	7916729.588	562850.404	574.409	FG
2115006	7916739.563	562850.386	573.976	FG
2115007	7916750.034	562860.302	573.78	FG
2115008	7916739.162	562860.346	574.253	FG
2115009	7916729.425	562860.341	574.636	FG
2115010	7916719.089	562860.445	575.078	FG
2115011	7916709.889	562860.506	575.284	FG
2115012	7916699.86	562860.992	575.636	FG
2115013	7916699.762	562869.12	575.893	FG
2115014	7916709.48	562870.179	575.569	FG
2115015	7916719.562	562870.584	575.215	FG
2115016	7916729.554	562870.638	574.91	FG
2115017	7916739.746	562870.299	574.471	FG
2115018	7916749.341	562870.098	574.008	FG
2115019	7916759.844	562869.461	573.65	FG
2115020	7916767.751	562870.572	573.302	FG
2115021	7916715.939	562882.263	575.643	FG
2115022	7916730.398	562880.677	575.059	FG

Point No.	Northing	Easting	Elevation	Location
2115023	7916739.346	562880.095	574.716	FG
2115024	7916749.208	562879.134	574.252	FG
2115025	7916759.937	562879.227	573.858	FG
2115026	7916769.184	562880.019	573.501	FG
2115027	7916780.053	562880.345	573.265	FG
2115028	7916789.899	562895.523	573.084	FG
2115029	7916779.234	562894.964	573.398	FG
2115030	7916769.158	562894.569	573.714	FG
2115031	7916759.567	562893.994	574.061	FG
2115032	7916750.692	562892.665	574.533	FG
2115033	7916740.476	562895.427	575.028	FG
2115034	7916730.161	562895.75	575.433	FG
2115035	7916721.301	562896.059	575.839	FG
2115036	7916730.032	562904.643	575.692	FG
2115037	7916739.93	562904.733	575.251	FG
2115038	7916749.821	562904.909	574.819	FG
2115039	7916761.438	562904.857	574.3	FG
2115040	7916770.011	562905.71	573.924	FG
2115041	7916779.743	562905.581	573.547	FG
2115042	7916790.506	562915.396	573.549	FG
2115043	7916780.099	562913.393	573.815	FG
2115044	7916769.479	562914.94	574.235	FG
2115045	7916759.96	562913.644	574.573	FG
2115046	7916749.881	562914.255	575.012	FG
2115047	7916740.652	562915.34	575.402	FG
2115048	7916739.761	562925.202	575.65	FG
2115049	7916749.991	562925.396	575.199	FG
2115050	7916759.316	562925.856	574.82	FG
2115051	7916770.363	562925.806	574.527	FG
2115052	7916780.39	562926.605	574.312	FG
2115053	7916789.561	562926.234	574.048	FG
2115054	7916799.676	562926.381	573.875	FG
2115055	7916799.962	562935.749	574.282	FG
2115056	7916790.587	562936.941	574.476	FG
2115057	7916779.953	562935.997	574.59	FG
2115058	7916769.541	562934.678	574.833	FG
2115059	7916759.985	562934.627	575.122	FG
2115060	7916750.446	562935.596	575.464	FG
2115061	7916741.229	562934.309	575.741	FG
2115062	7916750.04	562944.545	575.763	FG
2115063	7916759.984	562945.771	575.492	FG
2115064	7916769.53	562945.693	575.207	FG
2115065	7916779.308	562946.161	575.075	FG
2115066	7916789.176	562946.802	574.962	FG
2115067	7916798.855	562950.226	574.9	FG
2115068	7916800.306	562961.22	575.233	FG
2115069	7916790.43	562959.822	575.565	FG

Point No.	Northing	Easting	Elevation	Location
2115070	7916779.933	562958.584	575.64	FG
2115071	7916769.905	562959.146	575.769	FG
2115072	7916759.446	562959.229	576.056	FG
2115073	7916771.393	562970.104	576.572	FG
2115074	7916780.313	562970.122	576.278	FG
2115075	7916789.992	562968.501	575.873	FG
2115076	7916797.722	562970.575	575.676	FG
2115077	7916803.008	562980.907	575.812	EO KT
2115078	7916794.469	562978.726	576.103	EO KT
2115079	7916785.524	562976.402	576.365	EO KT
2115080	7916777.222	562973.761	576.518	EO KT
2115081	7916769.655	562970.397	576.599	EO KT
2115082	7916760.966	562964.952	576.39	EO KT
2115083	7916753.87	562957.973	576.095	EO KT
2115084	7916747.501	562950.706	575.839	EO KT
2115085	7916742.475	562942.295	575.83	EO KT
2115086	7916738.553	562933.711	575.831	EO KT
2115087	7916735.745	562925.398	575.861	EO KT
2115088	7916732.151	562917.1	575.948	EO KT
2115089	7916727.981	562908.93	575.944	EO KT
2115090	7916723.904	562900.887	575.857	EO KT
2115091	7916718.77	562893.469	575.888	EO KT
2115092	7916713.535	562885.953	575.803	EO KT
2115093	7916696.578	562842.815	575.36	FG TOE
2115094	7916696.994	562845.324	575.305	FG
2115095	7916709.957	562844.158	574.881	FG
2115096	7916709.267	562842.021	574.967	FG TOE
2115097	7916717.795	562842.214	574.722	FG TOE
2115098	7916717.293	562844.754	574.72	FG TOE
2115099	7916727.513	562847.227	574.375	FG
2115100	7916728.169	562844.814	574.339	FG TOE
2115101	7916736.969	562847.411	574.184	FG TOE
2115102	7916736.329	562849.141	574.069	FG
2115103	7916745.483	562853.371	573.821	FG
2115104	7916747.12	562851.136	573.861	FG TOE
2115105	7916756.586	562856.737	573.556	FG TOE
2115106	7916755.658	562858.182	573.503	FG
2115107	7916764.408	562863.785	573.253	FG
2115108	7916765.392	562862.856	573.328	FG TOE
2115109	7916772.402	562868.97	573.272	FG TOE
2115110	7916771.781	562869.958	573.151	FG
2115111	7916779.383	562876.43	573.163	FG TOE
2115112	7916785.641	562883.443	573.305	FG TOE
2115113	7916784.693	562884.993	573.153	FG TOE
2115114	7916791.354	562894.325	573.028	FG TOE
2115115	7916796.555	562904.618	573.253	FG TOE
2115116	7916800.403	562915.279	573.475	FG TOE

Point No.	Northing	Easting	Elevation	Location
2115117	7916802.259	562923.778	573.777	FG TOE
2115118	7916804.194	562932.646	574.1	FG TOE
2115119	7916805.171	562941.277	574.582	FG TOE
2115120	7916805.336	562950.097	574.917	FG TOE
2115121	7916805.239	562958.332	575.279	FG TOE
2115122	7916804.764	562963.972	575.25	FG TOE
2115123	7916802.817	562963.587	575.224	FG
2115124	7916803.769	562954.11	574.908	FG
2115125	7916808.902	562963.638	576.901	FG CREST
2115126	7916809.499	562956.036	576.952	FG CREST
2115127	7916810.338	562947.711	576.892	FG CREST
2115128	7916811.023	562940.377	576.912	FG CREST
2115129	7916811.404	562932.159	576.835	FG CREST
2115130	7916810.995	562924.378	576.699	FG CREST
2115131	7916809.783	562916.076	576.649	FG CREST
2115132	7916808.107	562908.348	576.609	FG CREST
2115133	7916805.556	562900.487	576.568	FG CREST
2115134	7916803.001	562893.316	576.691	FG CREST
2115135	7916800.08	562887.931	576.532	FG CREST
2115136	7916799.449	562886.809	576.507	FG CREST
2115137	7916794.794	562881.045	576.156	FG CREST
2115138	7916788.61	562873.262	576.2	FG CREST
2115139	7916783.947	562867.369	576.441	FG CREST
2115140	7916779.783	562862.711	576.64	FG CREST
2115141	7916774.237	562857.417	576.875	FG CREST
2115142	7916767.379	562852.472	576.905	FG CREST
2115143	7916759.734	562847.864	576.963	FG CREST
2115144	7916753.259	562844.385	576.954	FG CREST
2115145	7916747.185	562841.557	576.981	FG CREST
2115146	7916739.181	562839.189	576.949	FG CREST
2115147	7916731.85	562837.433	576.949	FG CREST
2115148	7916723.391	562836.491	576.926	FG CREST
2115149	7916716.801	562836.181	576.925	FG CREST
2115150	7916707.982	562836.299	576.908	FG CREST
2115151	7916700.125	562837.024	577.056	FG CREST
2115152	7916695.697	562837.148	577.139	FG CREST
2115153	7916687.874	562839.093	577.095	FG CREST
2115154	7916689.817	562841.589	576.07	FG
2115155	7916696.096	562840.081	576.048	FG
2115156	7916704.09	562839.278	576.02	FG
2115157	7916708.951	562838.666	576.059	FG
2115158	7916717.532	562838.497	575.97	FG
2115159	7916727.148	562839.71	575.855	FG
2115160	7916736.489	562841.528	575.802	FG
2115161	7916744.793	562844.55	575.554	FG
2115162	7916751.517	562847.973	575.429	FG
2115163	7916758.77	562852.001	575.368	FG

Point No.	Northing	Easting	Elevation	Location
2115164	7916765.822	562856.546	575.199	FG
2115165	7916772.504	562862.152	575.024	FG
2115166	7916777.53	562867.474	574.893	FG
2115167	7916782.397	562872.376	574.841	FG
2115168	7916787.623	562878.574	574.679	FG
2115169	7916792.049	562885.538	574.476	FG
2115170	7916796.122	562891.79	574.689	FG
2115171	7916799.873	562898.715	574.898	FG
2115172	7916802.355	562904.862	575.008	FG
2115173	7916805.372	562912.582	575.22	FG
2115174	7916807.739	562923.263	575.458	FG
2115175	7916808.231	562932.241	575.463	FG
2115176	7916808.036	562941.219	575.704	FG
2115177	7916808.057	562949.408	575.935	FG
2115178	7916687.583	562838.288	577.155	BACK FG
2115179	7916687.515	562838.266	577.122	BACK FG
2115180	7916695.43	562836.059	577.065	BACK FG
2115181	7916700.006	562835.546	577.118	BACK FG
2115182	7916707.862	562835.097	576.976	BACK FG
2115183	7916717.674	562834.955	576.901	BACK FG
2115184	7916723.509	562835.303	576.978	BACK FG
2115185	7916731.797	562836.393	577.122	BACK FG
2115186	7916739.338	562838.086	577.068	BACK FG
2115187	7916747.462	562840.748	576.985	BACK FG
2115188	7916753.734	562843.556	577.055	BACK FG
2115189	7916760.3	562847.006	577.063	BACK FG
2115190	7916767.958	562851.875	576.942	BACK FG
2115191	7916774.967	562856.768	576.894	BACK FG
2115192	7916780.208	562861.864	576.748	BACK FG
2115193	7916785.222	562866.191	576.502	BACK FG
2115195	7916796.248	562879.861	576.236	BACK FG
2115196	7916800.668	562885.982	576.456	BACK FG
2115197	7916804.202	562892.899	576.663	BACK FG
2115198	7916806.801	562899.732	576.611	BACK FG
2115199	7916809.376	562907.353	576.638	BACK FG
2115200	7916811.078	562915.609	576.629	BACK FG
2115201	7916812.101	562924.256	576.768	BACK FG
2115202	7916812.604	562932.065	576.854	BACK FG
2115203	7916812.23	562940.198	576.937	BACK FG
2115204	7916811.561	562948.039	576.904	BACK FG
2115205	7916810.812	562956.306	576.997	BACK FG
2115206	7916809.971	562965.208	576.881	BACK FG
2115207	7916804.159	562974.561	575.775	TOE FG
2115208	7916803.263	562981.119	575.825	TOE FG
2115209	7916806.467	562982.075	576.886	FG CREST
2115210	7916807.176	562974.13	576.824	FG CREST
2115211	7916800.042	562974.467	575.698	FG

Point No.	Northing	Easting	Elevation	Location
2115212	7916800.203	562965.752	575.404	FG
2115213	7916803.327	562939.626	574.365	FG
2115214	7916801.452	562923.572	573.776	FG
2115215	7916797.513	562916.449	573.455	FG
2115216	7916794.096	562905.807	573.051	FG
2115217	7916690.544	562862.634	575.951	FG KT
2115218	7916693.488	562855.948	575.645	FG
2115219	7916693.476	562856.115	575.707	FG
2115220	7916694.291	562848.495	575.453	FG
2115221	7916690.213	562844.879	575.463	FG
3250001	7916875.319	562910.782	570.737	RR CREST
3250002	7916879.431	562912.971	570.778	RR CREST
3250003	7916882.897	562914.17	570.71	RR CREST
3250004	7916886.491	562916.139	570.792	RR CREST
3250005	7916889.581	562917.909	570.867	RR CREST
3250006	7916893.988	562919.061	570.793	RR CREST
3250007	7916897.051	562920.422	570.806	RR CREST
3250008	7916899.863	562921.088	570.725	RR CREST
3250009	7916903.374	562921.667	570.665	RR CREST
3250010	7916906.385	562922.858	570.835	RR CREST
3250011	7916908.645	562924.633	571.032	RR CREST
3250012	7916912.059	562926.137	571.136	RR CREST
3250013	7916916.239	562926.925	571.046	RR CREST
3250014	7916921.418	562927.966	570.847	RR CREST
3250015	7916923.488	562929.527	571.063	RR CREST
3250016	7916927.204	562930.529	571.013	RR CREST
3250017	7916930.307	562931.22	570.934	RR CREST
3250018	7916934.1	562931.565	570.873	RR CREST
3250019	7916937.103	562932.642	570.969	RR CREST
3250020	7916942.428	562934.132	570.79	RR CREST
3250021	7916946.862	562935.507	570.678	RR CREST
3250022	7916949.684	562936.975	570.632	RR CREST
3250023	7916953.714	562937.87	570.669	RR CREST
3250024	7916956.91	562938.634	570.576	RR CREST
3250025	7916960.026	562939.732	570.629	RR CREST
3250026	7916963.089	562940.65	570.601	RR CREST
3250027	7916966.951	562941.169	570.442	RR CREST
3250028	7916969.67	562942.358	570.276	RR CREST
3250029	7916973.533	562943.758	570.342	RR CREST
3250030	7916977.689	562945.205	570.406	RR CREST
3250031	7916982.412	562946.876	570.345	RR CREST
3250032	7916985.427	562948.083	570.264	RR CREST
3250033	7916988.614	562948.971	570.223	RR CREST
3250034	7916992.075	562949.759	570.271	RR CREST
3250035	7917015.253	562963.56	570.141	RR CREST
3250036	7917018.817	562966.406	570.149	RR CREST
3250037	7917021.944	562968.849	570.215	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250038	7917024.684	562970.703	570.179	RR CREST
3250039	7917027.702	562973.154	570.352	RR CREST
3250040	7917029.466	562975.154	570.416	RR CREST
3250041	7917031.447	562977.006	570.562	RR CREST
3250042	7917033.537	562978.642	570.632	RR CREST
3250043	7917035.381	562980.902	570.692	RR CREST
3250044	7917037.888	562984.451	570.789	RR CREST
3250045	7917037.611	562985.6	571.089	RR CREST
3250046	7917039.47	562988.454	571.341	RR CREST
3250047	7917041.063	562991.203	571.498	RR CREST
3250048	7917043.466	562994.413	571.599	RR CREST
3250049	7917046.012	562997.414	571.426	RR CREST
3250050	7917047.728	563000.36	571.554	RR CREST
3250051	7917049.103	563003.222	571.572	RR CREST
3250052	7917050.552	563005.4	571.325	RR CREST
3250053	7917053.323	563008.304	570.777	RR CREST
3250054	7917054.542	563010.382	570.823	RR CREST
3250055	7917056.461	563013.155	570.51	RR CREST
3250056	7917058.36	563015.729	570.495	RR CREST
3250057	7917061.027	563018.762	570.327	RR CREST
3250058	7917062.979	563021.748	570.382	RR CREST
3250059	7917064.854	563023.546	570.178	RR CREST
3250060	7917066.814	563026.575	570.111	RR CREST
3250061	7917068.495	563028.508	569.985	RR CREST
3250062	7917069.453	563030.803	570.049	RR CREST
3250063	7917068.822	563030.46	569.845	RR CREST
3250064	7917066.495	563027.823	569.948	RR CREST
3250065	7917065.28	563025.617	569.922	RR CREST
3250066	7917063.888	563023.491	570.024	RR CREST
3250067	7917062.643	563021.706	570.016	RR CREST
3250068	7917073.615	563035.829	570.003	RR CREST
3250069	7917075.529	563038.879	569.991	RR CREST
3250070	7917077.219	563041.272	569.938	RR CREST
3250071	7917079.376	563044.591	569.84	RR CREST
3250072	7917081.692	563047.37	569.895	RR CREST
3250073	7917083.891	563051.336	570.006	RR CREST
3250074	7917086.583	563054.314	569.957	RR CREST
3250075	7917087.363	563055.697	569.824	RR CREST
3250076	7917155.262	563157.782	570.599	RR CREST
3250077	7917156.82	563160.844	570.375	RR CREST
3250078	7917159.063	563164.782	570.133	RR CREST
3250079	7917160.057	563167.139	570.095	RR CREST
3250080	7917161.486	563171.825	570.065	RR CREST
3250081	7917162.339	563175.75	570.065	RR CREST
3250082	7917162.766	563178.68	570.01	RR CREST
3250083	7917163.462	563182.851	570.128	RR CREST
3250084	7917163.463	563186.527	570.243	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250085	7917163.225	563190.325	570.29	RR CREST
3250086	7917162.772	563194.804	570.357	RR CREST
3250087	7917162.719	563198.859	570.279	RR CREST
3250088	7917162.102	563203.145	570.362	RR CREST
3250089	7917161.696	563207.404	570.407	RR CREST
3250090	7917161.226	563211.337	570.276	RR CREST
3250091	7917160.744	563213.158	570.244	RR CREST
3250092	7917159.721	563216.524	570.263	RR CREST
3250093	7917159.289	563219.92	570.085	RR CREST
3250094	7917158.052	563225.055	569.936	RR CREST
3250095	7917156.839	563228.485	569.94	RR CREST
3250096	7917155.637	563232.45	569.813	RR CREST
3250097	7917155.391	563235.563	569.706	RR CREST
3250098	7917154.974	563238.523	569.633	RR CREST
3250099	7917154.913	563241.105	569.482	RR CREST
3250100	7917154.358	563244.284	569.311	RR CREST
3250101	7917154.268	563247.577	569.208	RR CREST
3250102	7917153.896	563250.482	569.14	RR CREST
3250103	7917153.008	563254.539	569.147	RR CREST
3250104	7917152.679	563257.248	569.089	RR CREST
3250105	7917152.22	563260.714	569.123	RR CREST
3250106	7917151.602	563263.475	569.057	RR CREST
3250107	7917150.865	563265.263	569.076	RR CREST
3250108	7917150.333	563267.338	569.14	RR CREST
3250109	7917150.562	563268.453	569.13	RR CREST
3250110	7917150.435	563270.763	569.08	RR CREST
3250111	7917149.868	563272.663	568.998	RR CREST
3250112	7917149.251	563275.221	569.135	RR CREST
3250113	7917148.673	563278.256	569.081	RR CREST
3250114	7917147.686	563282.04	569.149	RR CREST
3250115	7917146.41	563287.32	569.147	RR CREST
3250116	7917145.094	563292.01	569.009	RR CREST
3250117	7917144.345	563296.437	569.073	RR CREST
3250118	7917143.277	563300.619	569.098	RR CREST
3250119	7917141.998	563304.855	569.194	RR CREST
3250120	7917140.912	563308.279	569.173	RR CREST
3250121	7917139.651	563312.274	569.198	RR CREST
3250122	7917137.843	563317.233	569.112	RR CREST
3250123	7917136.148	563322.648	569.202	RR CREST
3250124	7917135.417	563326.44	569.129	RR CREST
3250125	7917134.28	563330.197	569.214	RR CREST
3250126	7917133.073	563333.068	569.303	RR CREST
3250127	7917132.176	563336.618	569.211	RR CREST
3250128	7917131.639	563339.382	569.357	RR CREST
3250129	7917131.12	563341.665	569.391	RR CREST
3250130	7917130.01	563344.478	569.3	RR CREST
3250131	7917129.337	563349.123	569.333	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250132	7917128.788	563353.28	569.416	RR CREST
3250133	7917129.291	563357.029	569.295	RR CREST
3250134	7917128.748	563360.283	569.425	RR CREST
3250135	7917129.507	563366.7	569.481	RR CREST
3250136	7917131.049	563372.381	569.557	RR CREST
3250137	7917132.819	563378.054	569.537	RR CREST
3250138	7917133.575	563380.76	569.64	RR CREST
3250139	7917134.729	563383.725	569.812	RR CREST
3250140	7917136.019	563387.443	569.941	RR CREST
3250141	7917139.498	563393.042	569.968	RR CREST
3250142	7917142.712	563396.519	569.965	RR CREST
3250143	7917146.1	563399.318	569.891	RR CREST
3250144	7917149.944	563402.982	570.059	RR CREST
3250145	7917152.092	563405.145	569.94	RR CREST
3250146	7917155.083	563409.334	570.24	RR CREST
3250147	7917157.043	563412.241	570.443	RR CREST
3250148	7917159.433	563416.349	570.564	RR CREST
3250149	7917161.567	563420.149	570.635	RR CREST
3250150	7917164.043	563424.525	570.77	RR CREST
3250151	7917166.57	563428.402	570.82	RR CREST
3250152	7917168.7	563433.688	570.958	RR CREST
3250153	7917170.263	563437.877	570.978	RR CREST
3250154	7917171.147	563443.453	571.084	RR CREST
3250155	7917171.562	563448.733	571.179	RR CREST
3250156	7917171.814	563453.2	571.205	RR CREST
3250157	7917171.797	563457.197	571.364	RR CREST
3250158	7917172.534	563463.331	571.227	RR CREST
3250159	7917171.998	563466.4	571.137	RR CREST
3250160	7917170.899	563471.904	571.196	RR CREST
3250161	7917169.209	563478.244	571.202	RR CREST
3250162	7917167.471	563483.338	571.136	RR CREST
3250163	7917166.358	563488.268	570.982	RR CREST
3250164	7917163.381	563494.301	571.13	RR CREST
3250165	7917160.971	563500.778	571.222	RR CREST
3250166	7917157.916	563507.353	571.31	RR CREST
3250167	7917154.747	563513.436	571.3	RR CREST
3250168	7917151.4	563520.895	571.125	RR CREST
3250169	7917148.85	563525.794	571.171	RR CREST
3250170	7917145.38	563532.308	571.143	RR CREST
3250171	7917143.651	563536.083	571.125	RR CREST
3250172	7917141.265	563542.256	571.005	RR CREST
3250173	7917138.639	563548.14	570.829	RR CREST
3250174	7917135.978	563553.145	570.891	RR CREST
3250175	7917133.164	563559.497	570.894	RR CREST
3250176	7917130.631	563565.749	570.725	RR CREST
3250177	7917128.533	563570.901	570.718	RR CREST
3250178	7917125.225	563577.956	570.733	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250179	7917122.111	563584.707	570.76	RR CREST
3250180	7917119.032	563590.892	570.697	RR CREST
3250181	7917117.803	563593.927	570.648	RR CREST
3250182	7917114.281	563600.074	570.776	RR CREST
3250183	7917111.126	563606.532	570.695	RR CREST
3250184	7917108.763	563612.365	570.578	RR CREST
3250185	7917106.247	563618.424	570.373	RR CREST
3250186	7917103.624	563623.386	570.312	RR CREST
3250187	7917101.58	563627.259	570.26	RR CREST
3250188	7917100.522	563629.935	570.222	RR CREST
3250189	7917098.353	563633.243	570.038	RR CREST
3250190	7917096.176	563636.432	570.118	RR CREST
3250191	7917093.888	563640.102	570.215	RR CREST
3250192	7917091.687	563644.945	570.346	RR CREST
3250193	7917089.782	563649.448	570.376	RR CREST
3250194	7917088.162	563654.068	570.504	RR CREST
3250195	7917084.771	563661.844	570.491	RR CREST
3250196	7917081.804	563668.98	570.418	RR CREST
3250197	7917079.438	563674.586	570.306	RR CREST
3250198	7917078.224	563678.334	570.247	RR CREST
3250199	7917078.651	563680.363	570.125	RR CREST
3250200	7917080.467	563683.355	570.141	RR CREST
3250201	7917081.832	563685.197	570.168	RR CREST
3250202	7917083.54	563687.019	570.171	RR CREST
3250203	7917086.706	563689.823	570.197	RR CREST
3250204	7917088.803	563691.665	570.131	RR CREST
3250205	7917092.606	563695.328	570.302	RR CREST
3250206	7917095.792	563698.52	570.336	RR CREST
3250207	7917099.676	563702.017	570.255	RR CREST
3250208	7917103.262	563704.682	570.265	RR CREST
3250209	7917107.172	563708.011	570.33	RR CREST
3250210	7917112.177	563712.087	570.226	RR CREST
3250211	7917115.892	563715.096	570.239	RR CREST
3250212	7917118.353	563717.294	570.151	RR CREST
3250213	7917121.799	563720.297	570.168	RR CREST
3250214	7917124.703	563722.627	570.141	RR CREST
3250215	7917127.478	563724.305	570.105	RR CREST
3250216	7917131.34	563728.222	570.021	RR CREST
3250217	7917134.2	563730.38	570.024	RR CREST
3250218	7917137.567	563732.858	569.914	RR CREST
3250219	7917139.978	563734.768	569.857	RR CREST
3250220	7917142.808	563737.28	569.901	RR CREST
3250221	7917145.26	563739.555	569.872	RR CREST
3250222	7917147.462	563741.492	569.745	RR CREST
3250223	7917149.929	563743.656	569.758	RR CREST
3250224	7917152.676	563745.52	569.63	RR CREST
3250225	7917154.892	563746.885	569.675	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250226	7917158.478	563749.506	569.659	RR CREST
3250227	7917161.575	563752.227	569.589	RR CREST
3250228	7917165.261	563755.957	569.597	RR CREST
3250229	7917168.267	563758.63	569.579	RR CREST
3250230	7917172.27	563761.684	569.53	RR CREST
3250231	7917177.579	563765.961	569.5	RR CREST
3250232	7917182.106	563770.285	569.466	RR CREST
3250233	7917186.167	563773.808	569.497	RR CREST
3250234	7917189.891	563776.402	569.406	RR CREST
3250235	7917193.836	563779.407	569.354	RR CREST
3250236	7917196.447	563781.3	569.252	RR CREST
3250237	7917198.779	563784.106	569.298	RR CREST
3250238	7917201.961	563787.291	569.349	RR CREST
3250239	7917204.496	563789.342	569.297	RR CREST
3250240	7917206.994	563791.108	569.199	RR CREST
3250241	7917209.639	563794.033	569.211	RR CREST
3250242	7917212.9	563796.824	569.183	RR CREST
3250243	7917215.303	563798.669	569.072	RR CREST
3250244	7917218.402	563801.267	568.985	RR CREST
3250245	7917223.139	563804.531	568.867	RR CREST
3250246	7917225.547	563806.509	568.827	RR CREST
3250247	7917227.897	563808.555	568.812	RR CREST
3250248	7917229.265	563809.839	568.789	RR CREST
3250249	7917230.335	563808.287	568.782	RR CREST
3250250	7917228.504	563805.274	568.825	RR CREST
3250251	7917226.302	563803.428	568.877	RR CREST
3250252	7917225.463	563802.083	569.055	RR CREST
3250253	7917223.271	563799.636	569.11	RR CREST
3250254	7917221.68	563797.589	569.098	RR CREST
3250255	7917218.97	563795.784	569.096	RR CREST
3250256	7917217.394	563794.635	569.203	RR CREST
3250257	7917215.223	563791.838	569.248	RR CREST
3250258	7917211.379	563788.737	569.289	RR CREST
3250259	7917209.351	563786.996	569.242	RR CREST
3250260	7917207.365	563784.231	569.481	RR CREST
3250261	7917204.168	563781.26	569.583	RR CREST
3250262	7917201.3	563778.788	569.521	RR CREST
3250263	7917198.136	563776.106	569.507	RR CREST
3250264	7917196.719	563773.992	569.704	RR CREST
3250265	7917194.689	563772.444	569.615	RR CREST
3250266	7917190.242	563769.363	569.634	RR CREST
3250267	7917187.655	563767.646	569.635	RR CREST
3250268	7917185.023	563764.724	569.677	RR CREST
3250269	7917182.215	563763.015	569.628	RR CREST
3250270	7917179.011	563760.078	569.68	RR CREST
3250271	7917176.168	563758.099	569.626	RR CREST
3250272	7917172.46	563755.042	569.502	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250273	7917168.843	563752.164	569.481	RR CREST
3250274	7917164.747	563748.554	569.583	RR CREST
3250275	7917163.122	563747.028	569.517	RR CREST
3250276	7917161.077	563744.898	569.514	RR CREST
3250277	7917157.541	563741.753	569.585	RR CREST
3250278	7917154.852	563738.635	569.683	RR CREST
3250279	7917152.8	563736.544	569.795	RR CREST
3250280	7917150.366	563734.119	569.977	RR CREST
3250281	7917147.125	563731.32	570.032	RR CREST
3250282	7917143.689	563728.532	570.054	RR CREST
3250283	7917139.832	563725.25	570.158	RR CREST
3250284	7917135.63	563721.382	570.262	RR CREST
3250285	7917132.462	563718.577	570.366	RR CREST
3250286	7917129.28	563714.992	570.705	RR CREST
3250287	7917125.79	563712.116	570.607	RR CREST
3250288	7917122.66	563709.095	570.756	RR CREST
3250289	7917118.523	563705.476	570.784	RR CREST
3250290	7917114.865	563702.267	570.798	RR CREST
3250291	7917111.328	563698.99	570.918	RR CREST
3250292	7917108.49	563696.483	570.929	RR CREST
3250293	7917105.063	563693.854	570.762	RR CREST
3250294	7917101.588	563691.124	570.864	RR CREST
3250295	7917099.193	563688.737	570.883	RR CREST
3250296	7917096.435	563686.581	571.006	RR CREST
3250297	7917094.425	563685.04	570.872	RR CREST
3250298	7917091.663	563682.331	570.855	RR CREST
3250299	7917089.815	563680.425	570.703	RR CREST
3250300	7917089.072	563679.52	570.65	RR CREST
3250301	7917088.983	563677.983	570.723	RR CREST
3250302	7917089.18	563676.601	570.683	RR CREST
3250303	7917089.746	563674.18	570.817	RR CREST
3250304	7917091.138	563671.425	570.916	RR CREST
3250305	7917092.64	563668.292	570.967	RR CREST
3250306	7917093.908	563665.71	570.977	RR CREST
3250307	7917095.484	563662.316	570.911	RR CREST
3250308	7917097.02	563659.09	570.794	RR CREST
3250309	7917098.118	563656.289	570.817	RR CREST
3250310	7917100.128	563652.045	570.758	RR CREST
3250311	7917102.653	563647.657	570.7	RR CREST
3250312	7917103.897	563644.338	570.605	RR CREST
3250313	7917104.98	563641.319	570.39	RR CREST
3250314	7917106.862	563637.834	570.307	RR CREST
3250315	7917107.487	563635.649	570.083	RR CREST
3250316	7917108.507	563633.629	570.109	RR CREST
3250317	7917110.132	563630.234	570.186	RR CREST
3250318	7917111.126	563627.135	570.233	RR CREST
3250319	7917113.221	563624.378	570.329	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250320	7917114.613	563621.65	570.382	RR CREST
3250321	7917117.595	563617.95	570.604	RR CREST
3250322	7917119.185	563614.252	570.766	RR CREST
3250323	7917121.078	563611.195	570.712	RR CREST
3250324	7917123.183	563607.543	570.793	RR CREST
3250325	7917125.471	563602.742	570.939	RR CREST
3250326	7917127.27	563598.886	570.922	RR CREST
3250327	7917128.917	563595.419	570.772	RR CREST
3250328	7917130.992	563591.632	570.731	RR CREST
3250329	7917132.765	563587.548	570.913	RR CREST
3250330	7917134.697	563583.708	570.843	RR CREST
3250331	7917135.995	563580.238	570.875	RR CREST
3250332	7917138.327	563577.064	570.893	RR CREST
3250333	7917139.125	563573.668	570.944	RR CREST
3250334	7917141.164	563569.056	570.937	RR CREST
3250335	7917142.995	563565.302	570.903	RR CREST
3250336	7917144.865	563561.463	570.919	RR CREST
3250337	7917146.303	563558.169	570.897	RR CREST
3250338	7917147.997	563554.139	570.825	RR CREST
3250339	7917149.903	563549.691	570.857	RR CREST
3250340	7917151.132	563547.225	570.799	RR CREST
3250341	7917152.592	563543.753	570.795	RR CREST
3250342	7917154.767	563540.313	570.821	RR CREST
3250343	7917156.099	563537.552	570.938	RR CREST
3250344	7917157.633	563534.548	570.795	RR CREST
3250345	7917159.357	563532.133	570.905	RR CREST
3250346	7917160.994	563528.368	570.951	RR CREST
3250347	7917162.358	563524.659	570.994	RR CREST
3250348	7917163.609	563521.77	570.991	RR CREST
3250349	7917165.73	563517.947	570.963	RR CREST
3250350	7917167.598	563514.321	570.897	RR CREST
3250351	7917169.829	563508.862	570.806	RR CREST
3250352	7917172.281	563502.736	570.642	RR CREST
3250353	7917173.34	563501.116	570.809	RR CREST
3250354	7917175.623	563497.186	570.944	RR CREST
3250355	7917176.855	563493.893	571.095	RR CREST
3250356	7917179.11	563488.876	571.026	RR CREST
3250357	7917181.066	563484.52	571.021	RR CREST
3250358	7917182.156	563481.981	571.206	RR CREST
3250359	7917183.021	563478.222	571.269	RR CREST
3250360	7917183.83	563475.073	571.262	RR CREST
3250361	7917185.338	563469.371	571.415	RR CREST
3250362	7917185.912	563463.32	571.406	RR CREST
3250363	7917185.461	563456.539	571.431	RR CREST
3250364	7917185.326	563453.371	571.42	RR CREST
3250365	7917184.757	563449.158	571.283	RR CREST
3250366	7917183.91	563444.211	571.18	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250367	7917183.138	563439.723	571.211	RR CREST
3250368	7917182.135	563434.937	571.113	RR CREST
3250369	7917180.576	563432.019	571.059	RR CREST
3250370	7917179.59	563429.452	570.947	RR CREST
3250371	7917178.142	563425.983	570.992	RR CREST
3250372	7917176.657	563423.322	570.917	RR CREST
3250373	7917174.764	563419.84	570.84	RR CREST
3250374	7917171.855	563415.387	570.769	RR CREST
3250375	7917167.838	563411.026	570.537	RR CREST
3250376	7917163.848	563406.066	570.319	RR CREST
3250377	7917160.878	563402.716	570.016	RR CREST
3250378	7917157.739	563399.819	569.973	RR CREST
3250379	7917155.178	563397.697	569.906	RR CREST
3250380	7917152.647	563395.771	569.816	RR CREST
3250381	7917150.11	563392.926	569.846	RR CREST
3250382	7917147.985	563391.547	569.835	RR CREST
3250383	7917145.92	563389.112	569.859	RR CREST
3250384	7917144.413	563387.222	569.895	RR CREST
3250385	7917142.277	563385.235	569.814	RR CREST
3250386	7917140.928	563383.631	569.843	RR CREST
3250387	7917139.23	563380.1	569.784	RR CREST
3250388	7917138.031	563377.259	569.684	RR CREST
3250389	7917136.615	563373.447	569.57	RR CREST
3250390	7917135.263	563369.892	569.556	RR CREST
3250391	7917134.453	563367.82	569.418	RR CREST
3250392	7917133.76	563364.411	569.332	RR CREST
3250393	7917133.083	563362.373	569.257	RR CREST
3250394	7917132.893	563359.565	569.326	RR CREST
3250395	7917132.685	563356.779	569.263	RR CREST
3250396	7917132.656	563352.527	569.063	RR CREST
3250397	7917133.22	563350.351	569.118	RR CREST
3250398	7917133.343	563347.632	569.16	RR CREST
3250399	7917133.709	563345.782	569.189	RR CREST
3250400	7917134.145	563343.949	569.242	RR CREST
3250401	7917135.004	563341.527	569.125	RR CREST
3250402	7917136.013	563338.928	569.308	RR CREST
3250403	7917136.582	563335.934	569.233	RR CREST
3250404	7917137.216	563333.038	569.174	RR CREST
3250405	7917138.07	563330.15	569.275	RR CREST
3250406	7917138.696	563327.299	569.283	RR CREST
3250407	7917139.469	563325.15	569.252	RR CREST
3250408	7917140.026	563322.666	569.265	RR CREST
3250409	7917140.576	563320.211	569.191	RR CREST
3250410	7917141.335	563317.605	569.147	RR CREST
3250411	7917141.731	563315.755	569.213	RR CREST
3250412	7917142.905	563313.832	569.253	RR CREST
3250413	7917143.643	563310.072	569.117	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250414	7917144.956	563307.011	569.087	RR CREST
3250415	7917145.846	563304.256	569.034	RR CREST
3250416	7917146.797	563301.264	569.019	RR CREST
3250417	7917147.641	563297.434	569.001	RR CREST
3250418	7917148.3	563293.476	568.932	RR CREST
3250419	7917149.789	563288.182	569.081	RR CREST
3250420	7917150.402	563284.797	569.003	RR CREST
3250421	7917151.337	563281.289	569.085	RR CREST
3250422	7917151.812	563278.911	569.027	RR CREST
3250423	7917152.312	563276.206	569.062	RR CREST
3250424	7917153.044	563273.131	569.048	RR CREST
3250425	7917153.77	563270.431	569.045	RR CREST
3250426	7917154.485	563267.987	569.142	RR CREST
3250427	7917155.182	563264.465	569.009	RR CREST
3250428	7917155.886	563261.654	568.997	RR CREST
3250429	7917156.314	563258.326	569.105	RR CREST
3250430	7917156.797	563255.714	569.104	RR CREST
3250431	7917157.592	563251.46	569.212	RR CREST
3250432	7917157.837	563247.847	569.21	RR CREST
3250433	7917158.389	563243.493	569.283	RR CREST
3250434	7917158.953	563240.393	569.235	RR CREST
3250435	7917159.459	563237.356	569.378	RR CREST
3250436	7917159.751	563235.806	569.308	RR CREST
3250437	7917160.741	563237.006	569.511	BERM CREST
3250438	7917160.253	563236.872	569.405	BERM CREST
3250439	7917159.78	563240.151	569.599	BERM CREST
3250440	7917160.491	563241.019	569.63	BERM CREST
3250441	7917159.759	563245.169	569.557	BERM CREST
3250442	7917159.306	563245.274	569.563	BERM CREST
3250443	7917158.74	563249.296	569.481	BERM CREST
3250444	7917159.119	563249.663	569.501	BERM CREST
3250445	7917158.474	563255.437	569.403	BERM CREST
3250446	7917158.056	563255.593	569.418	BERM CREST
3250447	7917157.048	563260.979	569.408	BERM CREST
3250448	7917157.313	563261.919	569.41	BERM CREST
3250449	7917155.726	563268.59	569.382	BERM CREST
3250450	7917155.144	563268.641	569.338	BERM CREST
3250451	7917154.298	563275.47	569.413	BERM CREST
3250452	7917153.866	563275.557	569.435	BERM CREST
3250453	7917152.49	563282.19	569.424	BERM CREST
3250454	7917152.237	563282.341	569.458	BERM CREST
3250455	7917151.34	563289.271	569.462	BERM CREST
3250456	7917150.618	563289.206	569.476	BERM CREST
3250457	7917149.279	563296.904	569.459	BERM CREST
3250458	7917148.84	563296.829	569.431	BERM CREST
3250459	7917147.755	563303.728	569.459	BERM CREST
3250460	7917147.233	563303.807	569.474	BERM CREST

Point No.	Northing	Easting	Elevation	Location
3250461	7917145.043	563312.704	569.526	BERM CREST
3250462	7917144.252	563312.702	569.497	BERM CREST
3250463	7917142.826	563319.175	569.566	BERM CREST
3250464	7917142.095	563319.445	569.593	BERM CREST
3250465	7917141.139	563324.538	569.566	BERM CREST
3250466	7917140.526	563324.612	569.629	BERM CREST
3250467	7917139.753	563329.333	569.768	BERM CREST
3250468	7917139.423	563329.541	569.789	BERM CREST
3250469	7917139.168	563332.441	569.689	BERM CREST
3250470	7917138.457	563332.411	569.709	BERM CREST
3250471	7917138.238	563335.904	569.689	BERM CREST
3250472	7917137.697	563336.123	569.729	BERM CREST
3250473	7917137.603	563337.455	569.918	BERM CREST
3250474	7917136.861	563339.443	569.738	BERM CREST
3250475	7917136.501	563340.141	569.69	BERM CREST
3250476	7917136.116	563340.823	569.215	BERM TOE
3250477	7917137.229	563341.509	569	BERM TOE
3250478	7917138.436	563339.796	568.961	BERM TOE
3250479	7917139.405	563336.771	568.903	BERM TOE
3250480	7917140.404	563332.279	568.885	BERM TOE
3250481	7917141.51	563328.241	568.927	BERM TOE
3250482	7917143.171	563323.695	568.803	BERM TOE
3250483	7917144.487	563318.637	568.683	BERM TOE
3250484	7917145.522	563316.252	568.67	BERM TOE
3250485	7917146.293	563313.171	568.858	BERM TOE
3250486	7917147.322	563309.356	568.918	BERM TOE
3250487	7917148.509	563305.175	568.863	BERM TOE
3250488	7917149.737	563300.774	568.876	BERM TOE
3250489	7917150.74	563296.606	568.796	BERM TOE
3250490	7917152.048	563291.289	568.826	BERM TOE
3250491	7917153.18	563286.955	568.794	BERM TOE
3250492	7917153.626	563283.118	568.886	BERM TOE
3250493	7917155.128	563277.586	568.698	BERM TOE
3250494	7917155.939	563273.385	568.675	BERM TOE
3250495	7917156.666	563270.649	568.627	BERM TOE
3250496	7917157.178	563267.686	568.634	BERM TOE
3250497	7917158.502	563262.698	568.646	BERM TOE
3250498	7917159.42	563258.477	568.627	BERM TOE
3250499	7917160.233	563254.158	568.748	BERM TOE
3250500	7917160.652	563249.456	568.747	BERM TOE
3250501	7917161.304	563244.936	568.816	BERM TOE
3250502	7917161.564	563240.221	569.152	BERM TOE
3250503	7917161.439	563237.032	569.211	BERM TOE
3250504	7917160.666	563235.878	569.26	BERM TOE
3250505	7917160.102	563235.23	569.304	RR CREST
3250506	7917162.078	563228.596	569.253	RR CREST
3250507	7917163.564	563223.583	569.406	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250508	7917164.994	563216.809	569.605	RR CREST
3250509	7917166.39	563211.851	569.623	RR CREST
3250510	7917167.651	563205.535	569.886	RR CREST
3250511	7917168.2	563201.083	569.812	RR CREST
3250512	7917168.885	563194.902	569.774	RR CREST
3250513	7917168.899	563188.514	569.691	RR CREST
3250514	7917168.706	563184.764	569.721	RR CREST
3250515	7917168.393	563181.645	569.668	RR CREST
3250516	7917167.305	563175.274	569.696	RR CREST
3250517	7917167.003	563171.538	569.799	RR CREST
3250518	7917165.69	563166.457	569.961	RR CREST
3250519	7917164.95	563163.809	569.942	RR CREST
3250520	7917163.244	563159.258	569.942	RR CREST
3250521	7917161.881	563155.982	570.013	RR CREST
3250522	7917137.223	563117.254	569.704	BERM CREST
3250523	7917134.727	563113.765	569.783	BERM CREST
3250524	7917131.937	563109.185	569.776	BERM CREST
3250525	7917129.58	563105.185	569.811	BERM CREST
3250526	7917126.572	563100.785	569.927	BERM CREST
3250527	7917123.711	563096.748	569.967	BERM CREST
3250528	7917120.776	563092.312	570.02	BERM CREST
3250529	7917118.392	563088.812	570.196	BERM CREST
3250530	7917116.256	563085.968	570.169	BERM CREST
3250531	7917115.538	563084.949	569.979	BERM CREST
3250532	7917116.146	563084.081	570.114	BERM CREST
3250533	7917117.854	563086.535	570.182	BERM CREST
3250534	7917120.585	563090.469	570.048	BERM CREST
3250535	7917124.238	563095.966	570.002	BERM CREST
3250536	7917127.091	563099.814	569.925	BERM CREST
3250537	7917130.723	563105.1	569.825	BERM CREST
3250538	7917133.898	563110.344	569.741	BERM CREST
3250539	7917135.722	563113.792	569.746	BERM CREST
3250540	7917137.148	563116.445	569.69	BERM CREST
3250541	7917137.912	563117.531	569.574	BERM TOE
3250542	7917137.97	563116.14	569.595	BERM TOE
3250543	7917136.984	563113.113	569.268	BERM TOE
3250544	7917133.824	563107.633	569.167	BERM TOE
3250545	7917130.069	563101.874	569.293	BERM TOE
3250546	7917127.103	563097.682	569.342	BERM TOE
3250547	7917124.637	563094.319	569.427	BERM TOE
3250548	7917122.835	563091.461	569.411	BERM TOE
3250549	7917119.698	563087.297	569.616	BERM TOE
3250550	7917117.83	563084.995	569.85	BERM TOE
3250551	7917116.32	563083.538	570.006	BERM TOE
3250552	7917115.284	563082.568	570.038	BERM TOE
3250553	7917091.155	563053.132	570.044	RR CREST
3250554	7917088.125	563048.927	570.19	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250555	7917085.723	563045.17	570.021	RR CREST
3250556	7917082.585	563041.173	569.9	RR CREST
3250557	7917079.944	563038.3	569.958	RR CREST
3250558	7917076.889	563033.106	570.114	RR CREST
3250559	7917073.158	563027.886	570.043	RR CREST
3250560	7917071.098	563024.533	570.122	RR CREST
3250561	7917068.103	563019.081	570.04	RR CREST
3250562	7917065.477	563014.708	570.13	RR CREST
3250563	7917062.428	563009.868	570.2	RR CREST
3250564	7917060.354	563006.324	570.294	RR CREST
3250565	7917056.405	563000.536	570.235	RR CREST
3250566	7917053.572	562996.011	570.417	RR CREST
3250567	7917050.085	562991.665	570.175	RR CREST
3250568	7917047.943	562987.404	570.396	RR CREST
3250569	7917045.439	562984.406	570.43	RR CREST
3250570	7917044.75	562983.643	570.467	RR CREST
3250571	7917043.154	562981.443	570.476	RR CREST
3250572	7917041.45	562979.229	570.366	RR CREST
3250573	7917039.862	562976.154	570.412	RR CREST
3250574	7917036.987	562972.502	570.475	RR CREST
3250575	7917033.219	562968.839	570.48	RR CREST
3250576	7917030.048	562966.555	570.502	RR CREST
3250577	7917026.481	562964.279	570.486	RR CREST
3250578	7917024.574	562962.558	570.5	RR CREST
3250579	7917022.293	562961.138	570.524	RR CREST
3250580	7917020.563	562959.577	570.564	RR CREST
3250581	7917018.283	562957.909	570.51	RR CREST
3250582	7917014.968	562955.543	570.536	RR CREST
3250583	7917011.926	562953.789	570.488	RR CREST
3250584	7917009.091	562951.954	570.463	RR CREST
3250585	7917007.591	562951.414	570.458	RR CREST
3250586	7917004.749	562950.426	570.582	RR CREST
3250587	7917002.526	562949.738	570.299	RR CREST
3250588	7917000.508	562948.806	570.351	RR CREST
3250589	7916998.564	562948.013	570.377	RR CREST
3250590	7916996.837	562947.259	570.589	RR CREST
3250591	7916994.678	562946.073	570.526	RR CREST
3250592	7916992.215	562945.38	570.526	RR CREST
3250593	7916989.205	562944.852	570.471	RR CREST
3250594	7916986.981	562943.813	570.43	RR CREST
3250595	7916984.761	562943.043	570.282	RR CREST
3250596	7916982.836	562942.345	570.305	RR CREST
3250597	7916980.543	562941.544	570.391	RR CREST
3250598	7916978.186	562940.8	570.407	RR CREST
3250599	7916975.896	562939.75	570.358	RR CREST
3250600	7916973.657	562938.508	570.408	RR CREST
3250601	7916972.074	562937.826	570.548	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250602	7916969.135	562937.262	570.477	RR CREST
3250603	7916965.573	562935.93	570.562	RR CREST
3250604	7916962.107	562934.823	570.531	RR CREST
3250605	7916958.129	562933.265	570.713	RR CREST
3250606	7916955.398	562932.518	570.764	RR CREST
3250607	7916952.616	562932.016	570.663	RR CREST
3250608	7916949.97	562931.319	570.605	RR CREST
3250609	7916946.567	562929.986	570.657	RR CREST
3250610	7916946.305	562929.517	570.779	RR CREST
3250611	7916947.566	562929.14	571.028	BERM CREST
3250612	7916950.978	562930.392	571.148	BERM CREST
3250613	7916954.803	562931.172	571.103	BERM CREST
3250614	7916958.268	562932.309	571.086	BERM CREST
3250615	7916962.03	562933.257	571.098	BERM CREST
3250616	7916965.527	562934.269	571.062	BERM CREST
3250617	7916968.948	562935.797	570.941	BERM CREST
3250618	7916971.617	562936.903	570.97	BERM CREST
3250619	7916972.481	562937.209	570.993	BERM CREST
3250620	7916987.103	562941.02	570.526	BERM CREST
3250621	7916986.997	562942.108	570.582	BERM CREST
3250622	7916991.389	562942.465	570.697	BERM CREST
3250623	7916990.858	562944.12	570.632	BERM CREST
3250624	7916995.818	562943.71	570.612	BERM CREST
3250625	7916995.614	562945.514	570.706	BERM CREST
3250626	7917001.178	562945.814	570.469	BERM CREST
3250627	7917000.551	562947.98	570.512	BERM CREST
3250628	7917005.742	562947.772	570.496	BERM CREST
3250629	7917005.698	562949.834	570.605	BERM CREST
3250630	7917010.804	562950.126	570.486	BERM CREST
3250631	7917010.91	562951.801	570.628	BERM CREST
3250632	7917016.344	562953.869	570.638	BERM CREST
3250633	7917015.561	562955.403	570.621	BERM CREST
3250634	7917021.016	562957.161	570.502	BERM CREST
3250635	7917020.076	562958.736	570.615	BERM CREST
3250636	7917024.936	562960.685	570.466	BERM CREST
3250637	7917024.324	562961.681	570.536	BERM CREST
3250638	7917029.322	562963.355	570.666	BERM CREST
3250639	7917028.695	562964.658	570.723	BERM CREST
3250640	7917032.127	562965.761	570.513	BERM CREST
3250641	7917031.78	562966.703	570.469	BERM CREST
3250642	7917034.61	562968.964	570.463	BERM CREST
3250643	7917034.662	562969.664	570.524	BERM CREST
3250644	7917036.761	562970.929	570.469	BERM CREST
3250645	7917036.593	562971.708	570.594	BERM CREST
3250646	7917038.999	562973.498	570.378	BERM CREST
3250647	7917038.665	562974.099	570.415	BERM CREST
3250648	7917041.817	562976.386	570.518	BERM CREST

Point No.	Northing	Easting	Elevation	Location
3250649	7917041.361	562977.172	570.615	BERM CREST
3250650	7917044.288	562979.812	570.65	BERM CREST
3250651	7917043.615	562980.377	570.658	BERM CREST
3250652	7917045.924	562981.598	570.614	BERM CREST
3250653	7917044.821	562982.619	570.661	BERM CREST
3250654	7917045.723	562983.677	570.586	BERM CREST
3250655	7917046.54	562983.361	570.592	BERM CREST
3250656	7917046.146	562984.431	570.25	BERM TOE
3250657	7917047.065	562983.7	570.33	BERM TOE
3250658	7917046.599	562981.525	570.212	BERM TOE
3250659	7917044.561	562978.418	570.197	BERM TOE
3250660	7917041.038	562974.189	569.983	BERM TOE
3250661	7917037.365	562970.1	570.091	BERM TOE
3250662	7917034.742	562966.858	570.036	BERM TOE
3250663	7917031.397	562963.846	569.935	BERM TOE
3250664	7917027.323	562960.852	569.725	BERM TOE
3250665	7917023.756	562957.499	569.467	BERM TOE
3250666	7917019.739	562954.674	569.565	BERM TOE
3250667	7917015.758	562951.326	569.534	BERM TOE
3250668	7917011.706	562948.494	569.451	BERM TOE
3250669	7917008.403	562946.878	569.603	BERM TOE
3250670	7917004.103	562945.476	569.653	BERM TOE
3250671	7916999.877	562943.243	569.693	BERM TOE
3250672	7916995.657	562941.597	569.702	BERM TOE
3250673	7916992.049	562940.097	569.6	BERM TOE
3250674	7916989.022	562939.718	569.976	BERM TOE
3250675	7916987.191	562939.598	570.097	BERM TOE
3250678	7916973.482	562936.529	570.388	BERM TOE
3250679	7916969.87	562934.909	570.443	BERM TOE
3250680	7916966.641	562933.624	570.554	BERM TOE
3250681	7916961.891	562932.419	570.557	BERM TOE
3250682	7916957.562	562931.029	570.599	BERM TOE
3250683	7916953.384	562929.833	570.657	BERM TOE
3250684	7916950.899	562928.998	570.635	BERM TOE
3250685	7916948.637	562928.676	570.781	BERM TOE
3250686	7916947.283	562928.517	570.823	BERM TOE
3250687	7916946.897	562929.038	570.807	BERM TOE
3250688	7916944.69	562928.793	570.892	RR CREST
3250689	7916940.829	562927.169	570.976	RR CREST
3250690	7916935.407	562925.906	570.94	RR CREST
3250691	7916930.298	562924.66	571.035	RR CREST
3250692	7916925.276	562923.414	571.036	RR CREST
3250693	7916921.717	562922.091	571.073	RR CREST
3250694	7916916.352	562919.936	571.052	RR CREST
3250695	7916911.814	562918.799	571.096	RR CREST
3250696	7916908.179	562917.36	571.044	RR CREST
3250697	7916902.749	562916.04	571.051	RR CREST

Point No.	Northing	Easting	Elevation	Location
3250698	7916898.195	562914.743	570.969	RR CREST
3250699	7916893.365	562913.218	570.998	RR CREST
3250700	7916890.105	562912.116	570.912	RR CREST
3250701	7916886.346	562910.339	570.894	RR CREST
3250702	7916883.309	562908.547	570.916	RR CREST
3250703	7916879.563	562906.548	571.027	RR CREST
3250704	7916876.913	562904.659	571.091	RR CREST
3250705	7916874.305	562903.062	571.106	RR CREST
3250706	7916874.598	562902.131	571.091	RR CREST
3250707	7916876.649	562903.086	570.996	RR CREST
3250708	7916879.15	562904.69	570.997	RR CREST
3250709	7916881.475	562906.311	571.034	RR CREST
3250710	7916883.711	562907.956	570.87	RR CREST
3250711	7916886.245	562909.549	570.83	RR CREST
3250712	7916888.941	562911.299	570.876	RR CREST
3250713	7916891.066	562911.84	570.928	RR CREST

WRP Ditch Riprap Cover at Centerline

Point No.	Northing	Easting	Elevation	Location
0+000.00	7916788.57	562859.07	576.84	
0+010.00	7916797.66	562863.19	576.19	
0+020.00	7916807.38	562865.45	574.82	
0+030.00	7916817.04	562868.03	573.54	
0+040.00	7916826.67	562870.70	572.24	
0+050.00	7916836.06	562874.07	571.51	
0+060.00	7916844.98	562878.58	571.35	
0+070.00	7916852.83	562884.60	571.23	
0+080.00	7916859.73	562891.84	571.00	
0+090.00	7916866.63	562899.08	570.63	0.37
0+100.00	7916873.64	562906.19	570.52	0.34
0+110.00	7916882.17	562911.34	570.44	0.25
0+120.00	7916891.39	562915.21	570.33	0.27
0+130.00	7916900.79	562918.55	570.29	0.24
0+140.00	7916910.33	562921.52	570.28	0.28
0+150.00	7916919.78	562924.81	570.28	0.31
0+160.00	7916929.41	562927.46	570.24	0.28
0+170.00	7916939.09	562929.97	570.16	0.23
0+180.00	7916948.62	562932.97	570.11	0.24
0+190.00	7916958.06	562936.27	570.08	0.26
0+200.00	7916967.55	562939.41	570.05	0.27
0+210.00	7916977.00	562942.69	570.02	0.33
0+220.00	7916986.38	562946.15	569.97	0.32
0+230.00	7916995.65	562949.89	569.93	0.27
0+240.00	7917004.74	562954.04	569.92	0.33
0+250.00	7917013.53	562958.80	569.89	0.33
0+260.00	7917021.38	562964.99	569.85	0.30
0+270.00	7917029.60	562970.67	569.82	0.28
0+280.00	7917036.71	562977.63	569.80	0.27
0+290.00	7917042.87	562985.50	569.82	0.31
0+300.00	7917048.64	562993.67	569.79	0.40
0+310.00	7917053.89	563002.17	569.79	0.43
0+320.00	7917059.16	563010.65	569.71	0.30
0+330.00	7917064.95	563018.79	569.63	0.25
0+340.00	7917070.23	563027.27	569.55	0.19
0+350.00	7917075.85	563035.54	569.48	0.28
0+360.00	7917081.53	563043.77	569.38	0.18
0+370.00	7917087.36	563051.89	569.35	0.24
0+380.00	7917093.32	563059.92	0.00	
0+390.00	7917099.29	563067.94	0.00	
0+400.00	7917105.34	563075.90	0.00	
0+410.00	7917111.03	563084.11	0.00	
0+420.00	7917116.63	563092.38	0.00	
0+430.00	7917122.73	563100.31	0.00	
0+440.00	7917128.35	563108.56	0.00	

Point No.	Northing	Easting	Elevation	Location
0+450.00	7917133.69	563117.01	0.00	
0+460.00	7917139.11	563125.41	0.00	
0+470.00	7917144.43	563133.88	0.00	
0+480.00	7917149.92	563142.23	0.00	
0+490.00	7917155.24	563150.70	0.00	
0+500.00	7917160.10	563159.40	569.11	0.24
0+510.00	7917163.43	563168.81	569.09	0.30
0+520.00	7917165.53	563178.56	569.06	0.21
0+530.00	7917166.29	563188.51	569.02	0.17
0+540.00	7917165.89	563198.49	568.97	0.17
0+550.00	7917164.62	563208.40	568.95	0.15
0+560.00	7917162.60	563218.19	568.91	0.21
0+570.00	7917160.01	563227.84	568.89	0.24
0+580.00	7917157.56	563237.53	568.87	0.20
0+590.00	7917156.06	563247.40	568.85	0.16
0+600.00	7917154.77	563257.32	568.84	0.26
0+610.00	7917152.94	563267.14	568.83	0.27
0+620.00	7917150.84	563276.92	568.84	0.27
0+630.00	7917148.67	563286.68	568.84	0.30
0+640.00	7917146.33	563296.40	568.85	0.31
0+650.00	7917143.57	563306.00	568.85	0.23
0+660.00	7917140.38	563315.48	568.84	0.21
0+670.00	7917137.65	563325.10	568.83	0.20
0+680.00	7917135.05	563334.75	568.84	0.20
0+690.00	7917132.25	563344.35	568.83	0.19
0+700.00	7917131.27	563354.27	568.84	0.21
0+710.00	7917131.97	563364.20	568.84	0.20
0+720.00	7917134.20	563373.93	568.85	0.21
0+730.00	7917137.99	563383.16	568.84	0.19
0+740.00	7917143.39	563391.47	568.86	0.22
0+750.00	7917150.19	563398.79	568.86	0.22
0+760.00	7917156.91	563406.17	568.84	0.21
0+770.00	7917162.88	563414.18	568.84	0.21
0+780.00	7917168.39	563422.53	568.84	0.21
0+790.00	7917172.89	563431.40	568.84	0.19
0+800.00	7917175.63	563440.98	568.85	0.33
0+810.00	7917177.04	563450.87	568.83	0.18
0+820.00	7917177.81	563460.84	568.83	0.13
0+830.00	7917177.02	563470.75	568.84	0.18
0+840.00	7917174.52	563480.39	568.86	0.22
0+850.00	7917170.97	563489.73	568.85	0.21
0+860.00	7917167.44	563499.09	568.82	0.21
0+870.00	7917163.78	563508.39	568.83	0.20
0+880.00	7917159.49	563517.42	568.85	0.25
0+890.00	7917155.00	563526.35	568.84	0.25
0+900.00	7917150.49	563535.28	568.85	0.24
0+910.00	7917146.02	563544.22	568.84	0.21

Point No.	Northing	Easting	Elevation	Location
0+920.00	7917141.65	563553.21	568.84	0.22
0+930.00	7917137.51	563562.31	568.85	0.21
0+940.00	7917133.24	563571.34	568.84	0.22
0+950.00	7917129.18	563580.47	568.84	0.22
0+960.00	7917125.19	563589.64	568.84	0.24
0+970.00	7917121.04	563598.74	568.85	0.27
0+980.00	7917116.78	563607.78	568.85	0.24
0+990.00	7917112.17	563616.65	568.84	0.30
1+000.00	7917107.34	563625.41	568.85	0.34
1+010.00	7917102.74	563634.28	568.84	0.33
1+020.00	7917098.58	563643.38	568.84	0.27
1+030.00	7917094.32	563652.42	568.83	0.25
1+040.00	7917089.86	563661.37	568.85	0.29
1+050.00	7917085.40	563670.32	568.84	0.27
1+060.00	7917083.49	563679.92	568.83	0.26
1+070.00	7917089.38	563687.65	568.83	0.20
1+080.00	7917096.96	563694.17	568.84	0.24
1+090.00	7917104.72	563700.47	568.85	0.22
1+100.00	7917112.36	563706.92	568.84	0.19
1+110.00	7917119.87	563713.53	568.85	0.18
1+120.00	7917127.43	563720.06	568.86	0.24
1+130.00	7917135.06	563726.53	568.84	0.22
1+140.00	7917142.80	563732.86	568.82	0.20
1+150.00	7917150.41	563739.35	568.85	0.26
1+160.00	7917158.00	563745.85	568.83	0.28
1+170.00	7917165.44	563752.50	568.82	0.36
1+180.00	7917173.05	563759.00	568.83	0.34
1+190.00	7917180.69	563765.44	568.81	0.25
1+200.00	7917188.53	563771.65	568.76	0.22
1+210.00	7917196.17	563778.07	568.75	0.24
1+220.00	7917203.52	563784.86	568.73	0.25
1+230.00	7917210.80	563791.71	568.71	0.16
1+240.00	7917218.18	563798.47	568.69	0.14
1+250.00	7917225.57	563805.20	568.60	0.01
1+255.57	7917229.65	563808.98	568.57	0.08

August 29, 2016

BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

Mine Haul Road
Drainage Improvement Project
Phase 1 Construction
As-Built Report

Submitted to:
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON Canada
L6H 0C3

REPORT

Report Number: 1649295 (DOC008)

Distribution:

1 electronic copy - Baffinland Iron Mines Corporation
1 hardcopy- Golder Associates Ltd.

Golder Associates

Executive Summary

Golder Associates Ltd. (Golder) was retained by Baffinland Iron Mines Corporation (Baffinland) to provide engineering design and offsite technical support for the Phase 1 (pre-freshet 2016) construction activities related to the Mine Haul Road Drainage Improvement Project. Construction drawings and specifications were included in the design report summarizing the Mine Haul Road Drainage Improvement Project prepared for Baffinland by Golder (2016a). A key recognition for the overall project was that a phased approached for construction was required as it was not feasible to construct the entire works in a single period.

The Phase 1 scope of work included installation of seven twin culverts and inspection of the existing ditch and improving the ditch (as required) to meet the design requirements of cross-sectional area and erosion protection. It was recognized at the time of the design that the scope of work for Phase 1 construction may not be carried in completion due to weather constraints. Incomplete work (or partially completed) in Phase 1 was to be deferred to Phase 2 construction.

Phase 1 construction was carried out between April 25, 2016 and May 15, 2016. Baffinland and OPC North provided construction management and contract administration for the duration of the work. Nuna Logistics Ltd. was the main contractor responsible for the completion of the scope of work, quality control, and surveying. Hatch Ltd. provided quality assurance and Golder provided offsite engineering support during this period.

Six twin culverts and one single culvert were installed and the existing ditch was protected with rip along the mine haul road. The culvert trench was excavated by drilling and blasting due to the frozen ground conditions. The existing ditches were cleared of snow and inspected. Due to the time constraints and weather conditions the existing ditches were not modified. The existing ditches were observed to have little to no erosion protection. Rip rap was added along the length of the ditch, and in steep sections geotextile was placed prior to rip rap.

The following modifications were made to the design during construction:

- The culverts layout points were adjusted to fit the encountered field conditions.
- Only one culvert was installed at the CV2 culvert crossing location.
- Culverts inlet basins were configured to fit encountered field conditions.
- Downstream outflow pads were constructed without excavation to create a toe depression.
- The existing ditch was not modified to achieve the design dimensions.
- Ditch 7 and Ramps 1, 2, and 3 ditches were not constructed.
- An additional culvert (CV8) was installed in the magazine access road.

These modifications were made to accommodate field conditions and timing constraints. The modifications were made in discussion with Golder and are considered to have no material effect on the completed work relative to the design. Alterations and maintenance may be required in the future to accommodate these modifications.

The outstanding items from Phase 1 construction plus the additional requirements in Phase 2 construction are provided below:

- A post-construction inspection by a member of Golder's engineering team is to be carried out.
- Sections of the ditch should be modified to meet the design requirements if performance and/or observations indicate such.
- Ongoing inspection and maintenance of the rip rap is to be carried out as the rip rap rock sizes used in the ditch and culvert inlet basins and outflow pads are insufficient for the design storm as described in the design report (Golder 2016a).
- Develop and implement an inspection and maintenance program as per the design (Golder 2016a).
- Connect the downstream outflow pad to a stream/ flow path with sufficient protection to convey the design storm as per the design (Golder 2016a).
- Implement improvements to the mine haul road to reduce sediment loading (Golder 2016b).

The Phase 1 construction campaign was completed in substantial compliance with the design intent based on Golder's review of the information provided by Baffinland. Field changes that were made to suit the field conditions encountered.

The Reader is instructed to read the entire report, including appendices. Particular attention is to be paid to the *Study Limitations* section following the report text.

Table of Contents

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Baffinland Iron Mines Corporation (Baffinland) to provide engineering design and offsite technical support for the Phase 1 (pre-freshet 2016) construction activities related to the Mine Haul Road Drainage Improvement Project.

Baffinland owns and operates the Mary River Project, an open pit iron ore mine located on northern Baffin Island, in the Nunavut Territory at a latitude of 71°19' north and a longitude of 79°12' west. Operations comprise the blasting and excavation of ore and waste rock. Waste rock is managed in stockpiles. Ore is hauled from the open pit via the mine haul road to the crushing area. Following crushing, the ore is loaded onto trucks and hauled to the port facility for shipment to processing facilities. There are no processing facilities on-site.

Golder completed a site visit in February 2016 and carried out an options assessment for improving the water management system with Baffinland. Baffinland developed a Mine Haul Road Drainage Improvement Project which included modifications to the road side ditch and to the road culvert crossings in addition to the placement of additional mine haul road embankment fill as the preferred option. Golder prepared a design report summarizing the Mine Haul Road Drainage Improvement Project, including construction drawings and specifications (Golder 2016a). A key recognition for the overall project was that a phased approached for construction was required as it was not feasible to construct the entire works in a single period. Phase 1 construction was carried out between April 25, 2016 and May 15, 2016. This report summarizes the construction activities that took place as part of the Phase 1 construction campaign for the Mine Haul Road Drainage Improvement Project. Golder provided offsite engineering support during the Phase 1 construction.

The report is organized as follows:

- The original scope of work is described in Section 2;
- The division of responsibilities for the construction campaign is provided in Section 3;
- A summary of the as-built information provided by Baffinland for inclusion in this report is provided in Section 4;
- The modifications and scope revisions are provided in Section 5;
- The construction activities are described in Section 6;
- The construction quality control and quality assurance are described in Section 7; and
- The path forward is described in Section 8.

The Reader is instructed to read the entire report, including appendices. Particular attention is to be paid to the *Study Limitations* section following the report text.

2.0 PHASE 1 SCOPE OF WORK

Phase 1 construction of the mine haul road drainage improvement project was to be carried out prior to the 2016 spring freshet. The phase 1 scope of work included the following:

- Installation of seven twin culverts, including the construction of the culvert inlet basin and downstream outflow pad.
- Inspection of the existing ditch and improving the ditch (as required) to meet the design requirements of cross-sectional area and erosion protection.

It was recognized at the time of the design that the scope of work for Phase 1 construction may not be carried to completion due to weather constraints. Incomplete work (or partially completed) in Phase 1 was to be deferred to Phase 2 construction. Additionally, the drainage swale from approximately station 103+750 to 105+250 (if required) and the sediment traps (if required) within the ditch along the mine haul road would be carried out in Phase 2 construction if determined to be required based on conditions encountered in the field.

Golder is to perform a post-freshet 2016 inspection of the Phase 1 construction. As of the date of this report, this inspection had yet to be carried out but is expected to be scheduled.

3.0 DIVISION OF RESPONSIBILITIES

The division of responsibilities for the parties involved were as follows:

Baffinland

Role: Owner
Responsibilities: Construction management, contract administration

OPC North

Role: Owner's Representative
Responsibilities: Construction management, contract administration

Nuna Logistics Ltd.

Role: Contractor
Responsibilities: Completion of the scope of work, construction quality control, layout, and as-built surveying

Hatch Ltd.

Role: Owner's Representative (assisting OPC North)
Responsibilities: Quality assurance

Golder

Role: Designer and engineering support
Responsibilities: Technical support on an as requested basis, preparation of as-built report and drawings.

4.0 AS-BUILT INFORMATION PROVIDED BY BAFFINLAND

The following information was provided by Baffinland for inclusion in the as-built report:

- As-built surveys of the constructed culverts and ditch. These files were used to produce as-built drawings in Appendix A and a copy of the raw files is provided in Appendix B.

- Quality control and quality assurance construction checklists and photographs (Appendix C)

No material grain size analyses on the construction materials were carried out. No survey data of the trench backfill grades or downstream outflow pads were provided. Because the existing haul road survey data used in the design did not match the encountered field conditions, some additional survey data of the road shoulders was collected during construction and is presented in the as-built drawings.

5.0 MODIFICATIONS AND SCOPE REVISIONS

Modifications to the design provided in the construction drawings and specifications were required to accommodate field conditions that were encountered as construction progressed. The project scope of work was occasionally revised for similar reasons. The following modifications were made:

- The culverts layout points were adjusted to fit the encountered field conditions. The base mapping contour data used in the design did not match the encountered field conditions and as such the layout points of the culverts, culvert inlet basins and downstream outflow pads were adjusted. The culvert crossing locations were moved slightly to the best fit the existing conditions while maintaining the design requirements.
- Only 1 culvert was installed at the CV2 culvert crossing location. The required flow capacity is provided by this single culvert but the redundancy of twin culverts is not provided.
- Culverts inlet basins were configured to fit encountered field conditions. The width, depth, and side slopes varies at each inlet location and differs from the design configuration. A minimum depth of 0.6 m below the below the culvert to the base of the inlet basin was not obtained at some crossing locations. The inlet basins that were constructed smaller and with steeper side slopes than design requirements will still function as required however increased maintenance will be required. Where a minimum depth of 0.6 m was not achieved, there is a higher risk of sediment transportation downstream.
- Downstream outflow pads were constructed without excavation to create a toe depression. Instead of excavating the downstream slope, geotextile and rip rap were placed on the existing slope. The purpose of the toe depression was to dissipate energy to avoid erosion of the downstream slope. Improvements to the downstream outflow pad may be required.
- The existing ditch was not modified to achieve the design dimensions. Due to the timing of the construction period and the onset of the 2016 freshet, alterations to the ditch configuration were postponed. The existing ditch varies in depth, width and side slopes throughout the length. The existing ditch was protected with rip rap and due to the varying configuration the thickness of the rip rap varies throughout the length. Sections of the ditch may be required to be modified to meet the minimum design requirements.
- Ditch 7 and Ramps 1, 2, and 3 ditches were not constructed. Due to the timing of construction and the onset of the freshet these ditches were not constructed. These ditches should be constructed in the Phase 2 campaign.
- An additional culvert (CV8) was installed in the magazine access road. This culvert was not part of the design.

These modifications were made to accommodate field conditions and timing constraints. The modifications were made in discussion with Golder and are considered to have no material effect on the completed work relative to the design.

Alterations and maintenance may be required in the future to accommodate these modifications. Refer to a Section 8.0 for the path forward.

6.0 DISCUSSION ON CONSTRUCTION ACTIVITIES

Six twin culverts and 1 single culvert were installed and the existing ditch was protected with rip rap (Material Type 19) along the mine haul road between April 25, 2016 and May 15, 2016. Best efforts were made to remove the snow and ice from the construction areas and backfill material. Based on the encountered field conditions the culverts locations were adjusted to best fit the existing topography. The culvert trench was excavated by drilling and blasting due to the frozen ground conditions. Each culvert crossing, except for culvert CV2, was excavated and backfilled in two sections (left and right side of the haul road) to allow for haul traffic during construction. Bedding (Material Type 5) was placed and shaped by excavator bucket. Compaction of the trench backfill material (Material Types 5 and 8) was completed by a minimum of 5 passes with a walk behind plate tamper. The culvert inlet basins were drilled and blasted and lined with geotextile with the exception of culvert CV2 (through ramp 1) where geotextile was not used. Rip rap was placed within the culvert inlet basin and along the downstream outflow pad.

The existing ditches were cleared of snow and inspected. Due to the time constraints and weather conditions the existing ditches were not modified. The existing ditches were observed to have little to no erosion protection. Rip rap (Material Type 19) was added along the length of the ditch, and in steep sections geotextile was placed prior to rip rap.

7.0 CONSTRUCTION QUALITY CONTROL AND ASSURANCE

Construction quality control was provided by the Contractor. Quality assurance was provided by the Owner's Representative. No material testing was completed on the material types. Material was visually observed to meet specifications.

Inspection checklists were completed as record of the works being carried out as per the requirements of the specifications and are provided in Appendix C along with a photograph log of each culvert crossing and the ditch.

8.0 PATH FORWARD

The summary of the outstanding items from Phase 1 construction plus the additional requirements in Phase 2 construction are provided below:

- A post-construction inspection by a member of Golder's engineering team is to be carried out. The requirements of constructing the drainage swale between stations 103+750 to 105+250 as well as locations of sediment traps will be identified. It is expected that this inspection will be scheduled during 2016 prior to the onset of snowfall conditions.

- Sections of the ditch should be modified to meet the design requirements if performance and/or observations indicate such.
- The rip rap rock sizes used in the ditch and culvert inlet basins and outflow pads are insufficient for the design storm as described in the design report (Golder 2016). Rip rap in the specification was provided as it was the only size of material available at the time of construction however based on the design calculations sections of the ditch will require upgrading of the erosion protection. As per the design, ongoing inspection and maintenance of the rip rap is to be carried out.
- Develop and implement an inspection and maintenance program as per the design (Golder 2016a).
- Connect the downstream outflow pad to a stream/ flow path with sufficient protection to convey the design storm as per the design (Golder 2016a).
- Implement improvements to the mine haul road to reduce sediment loading (Golder 2016b).

9.0 CLOSING

The Phase 1 construction campaign was completed in substantial compliance with the design intent based on Golder's review of the information provided by Baffinland. Field changes that were made to suit the field conditions encountered have been described in Section 5. A path forward has been described in Section 8.

We trust this report provides the information you presently require. Should you have any comments or questions, please contact the undersigned.

Report Signature Page

GOLDER ASSOCIATES LTD.

Michelle Tyldesley, PEng (ON)
Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
P.M. BEDELL
LICENSEE
29 / 16 2016
NWT/NU

Paul M. Bedell, MESc, PEng
Principal, Senior Geotechnical Engineer

MJT/PMB/jl

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 29/08/2016
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

https://capws.golder.com/sites/1414686haulroadwatermanagement/phases and tasks/7000 as-built/final report/1649295 dft rpt as-built report baffinland mhr drainage improvements phase 1.docx

References

Golder (Golder Associates Ltd.). 2016a. Mine Haul Road Drainage Improvement Project Detailed Design Report-Draft. Prepared for Baffinland Iron Mine Corporation. Mississauga ON: Golder Associate Ltd. Golder Doc. No. No. 1649295. 4 May 2016.

Golder (Golder Associates Ltd.). 2016b. Mine Haul Road Drainage Improvement, Mary River Project. Prepared for Baffinland Iron Mine Corporation. Mississauga ON: Golder Associates Ltd. Golder Doc. No. 1649295. 6 April 2016.

Study Limitations

Golder Associates Ltd. (Golder) has prepared this document in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this document. No warrant, expressed or implied is made.

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APPENDIX A

As-Built Drawings

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

KEY PLAN
NOT TO SCALE

INDEX OF DRAWINGS		
DRAWING NO.	DRAWING SHEET TITLE	REVISION NO.
001	TITLE SHEET	2
002	GENERAL ARRANGEMENT PLAN	2
003	PLAN AND PROFILE STA 103+500 TO 104+080	2
004	PLAN AND PROFILE STA 104+080 TO 104+660	2
005	PLAN AND PROFILE STA 104+660 TO 105+250	2
006	PLAN AND PROFILE STA 105+250 TO 105+860	2
007	PLAN AND PROFILE STA 105+860 TO 106+460	2
008	PLAN AND PROFILE STA 106+460 TO 107+030	2
009	PLAN AND PROFILE STA 107+030 TO 107 + 620	2
010	PLAN AND PROFILE STA 107+620 TO 108+200	2
011	PLAN AND PROFILE STA 108+200 TO 108+770	2
012	PLAN AND PROFILE STA 108+770 TO 109+350	2
013	PLAN AND PROFILE STA 109+350 TO 109+821	2
014	PIPE CROSSING TYPICAL DETAILS AND CULVERT SCHEDULE	2
015	DITCHES AND SEDIMENT TRAPS TYPICAL DETAILS	2
016	CUT SLOPES EROSION PROTECTION DETAILS	2
017	DITCH SETOUT POINTS	2

SPECIFICATION		
SPECIFICATION NO.	SPECIFICATION TITLE	REVISION NO.
1649295-S	MINE HAUL ROAD DRAINAGE IMPROVEMENTS	0

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature Original Signed
Date
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

ORIGINAL SIGNED AND SEALED

STAMP/SEAL

CLIENT
Baffinland

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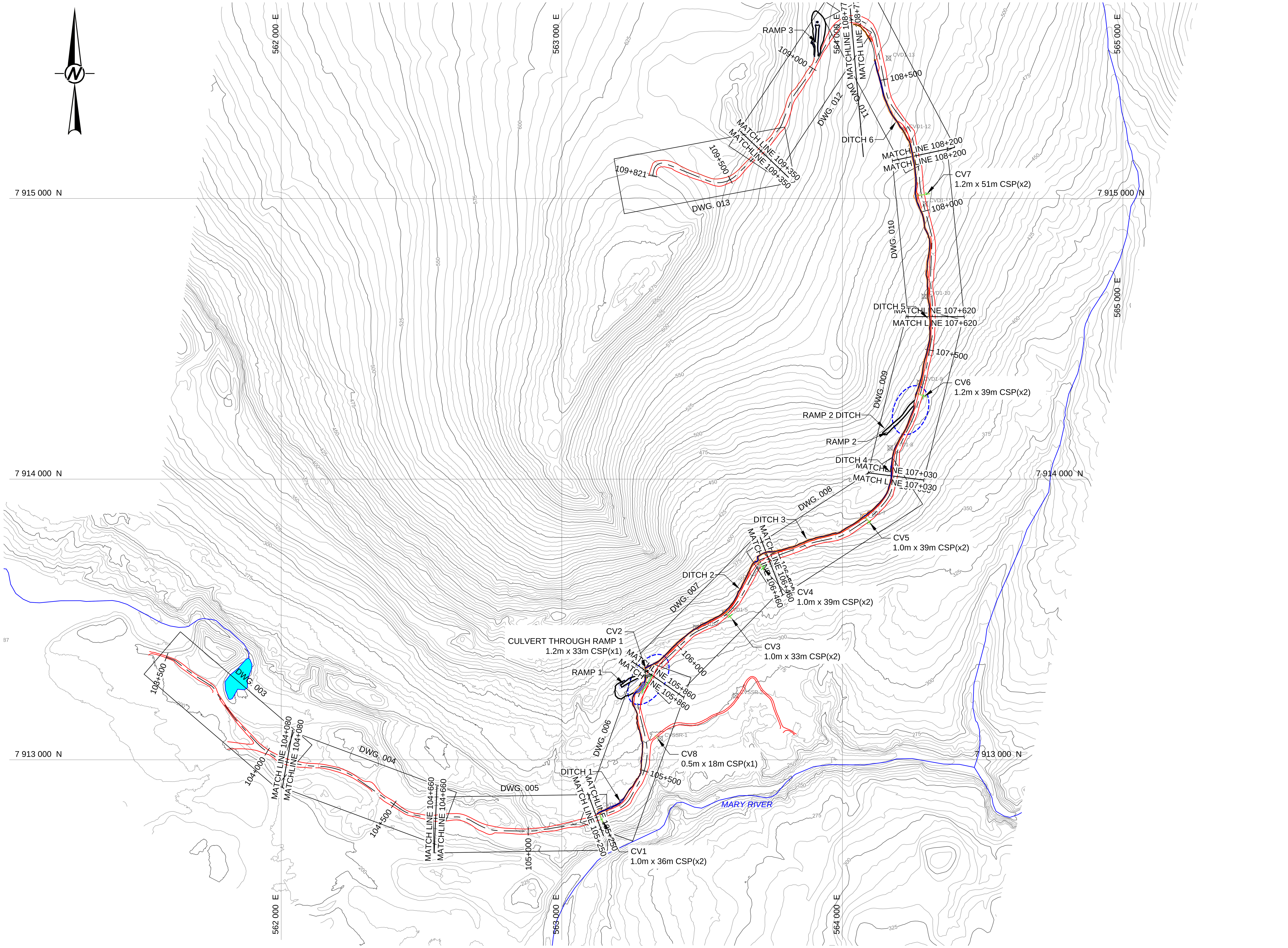
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
TITLE SHEET

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	1 of 17	001

Path: \\golder.gds\GAL\Mississauga\SIM\Clients\Baffinland_Iron_Mines_Corp\Baffin_Island\99_PROJ\1649295\40_PROD\0001_Water_Mgmt\ | File Name: 1649295-0001-CM-0001.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D
25 mm



LEGEND

- AS-BUILT CULVERT (KNIGHT PIESOLD, 2008)
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- EXISTING ROAD
- BASE MAPPING CONTOUR
- WATERCOURSE
- CV3 — PIPE CROSSING
- DITCH

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. COORDINATE SYSTEM IS UTM (NAD 83) ZONE 17.
3. CONTOUR INTERVAL IS 1 m WITH EXISTING TOPOGRAPHY.
4. AS-BUILT DRAWINGS SHOW PHASE 1 CONSTRUCTION.
5. THE INFORMATION PROVIDED ON THE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE AS-BUILT REPORT.
6. THE POTENTIAL SEDIMENT TRAPS WERE NOT CONSTRUCTED IN THIS CONSTRUCTION PHASE.
7. THE POTENTIAL DRAINAGE SWALE WAS NOT CONSTRUCTED IN THIS CONSTRUCTION PHASE.
8. THE EXISTING MINE HAUL ROAD CENTRELINE IS SHOWN FOR REFERENCE PURPOSES ONLY. THE EXISTING MINE ROAD WAS NOT SURVEYED IN COMPLETION IN PHASE 1 CONSTRUCTION AND THAT SHOWN HAS BEEN IDENTIFIED IN THE FIELD AS NOT ACCURATE.
9. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
10. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.

0 250 500
1:7,500 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

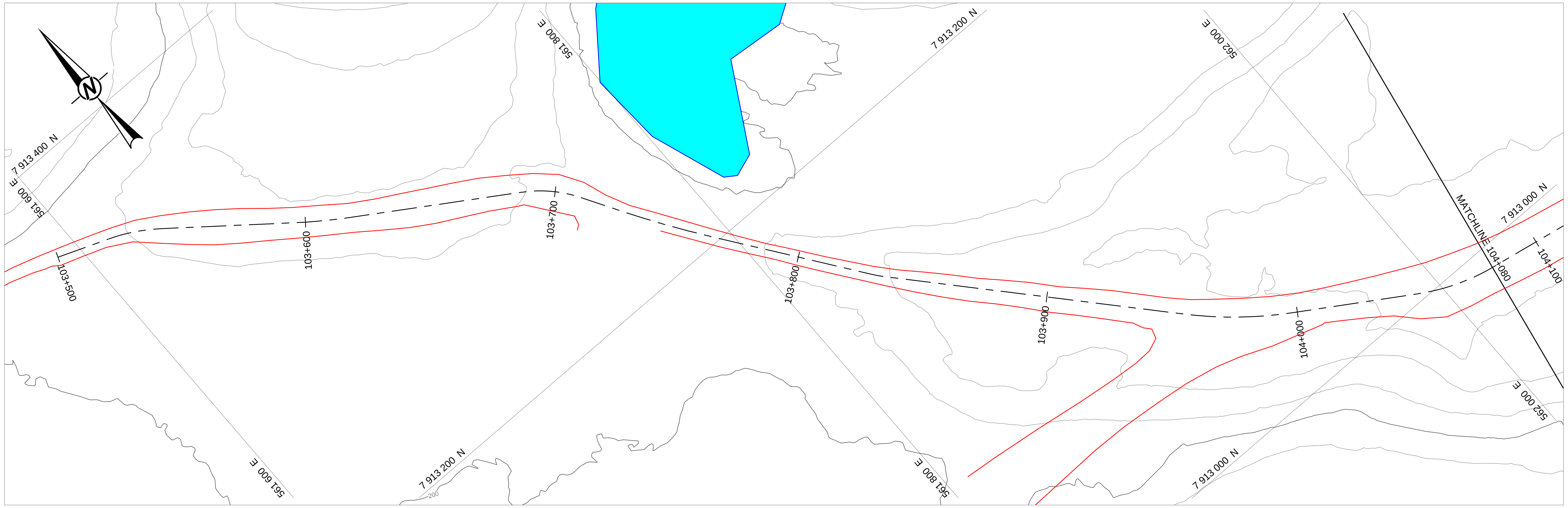
TITLE
GENERAL ARRANGEMENT PLAN

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	2 of 17	002

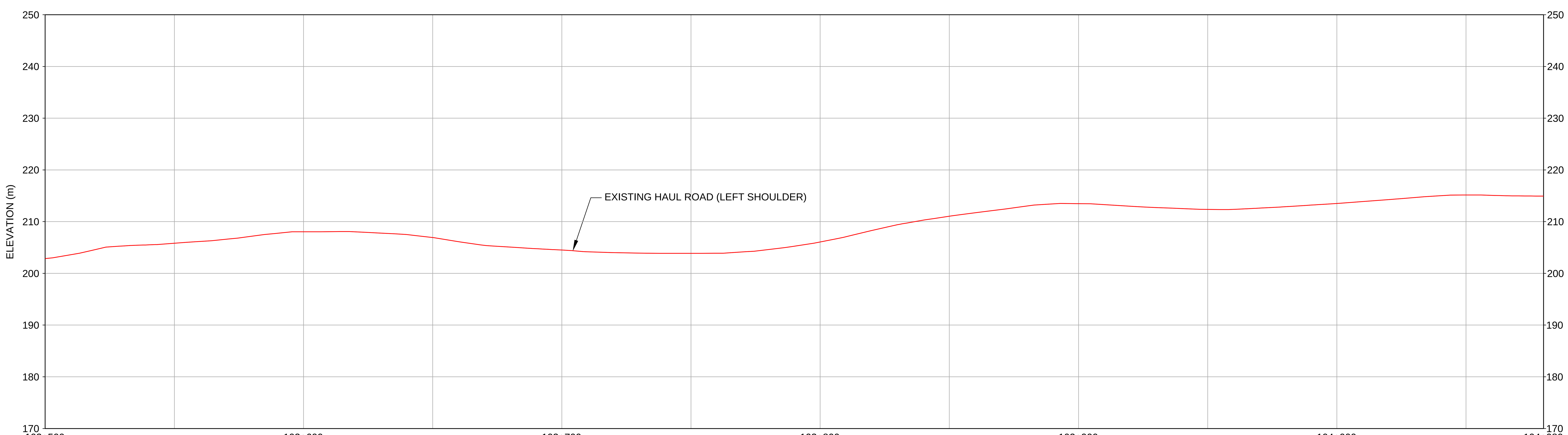
LEGEND

— — — — —	ORIGINAL GROUND SURFACE (2008)
———	EXISTING ROAD SHOULDER
═══	DITCH
108+000 —	ROAD CENTRELINE AND STATIONING (APPROXIMATE)
CVD1-8	AS-BUILT CULVERT LOCATION (2008)
CV3	PIPE CROSSING

NOTES
1. THE POTENTIAL DRAINAGE SWALE WAS NOT CONSTRUCTED.
2. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
3. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
4. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.

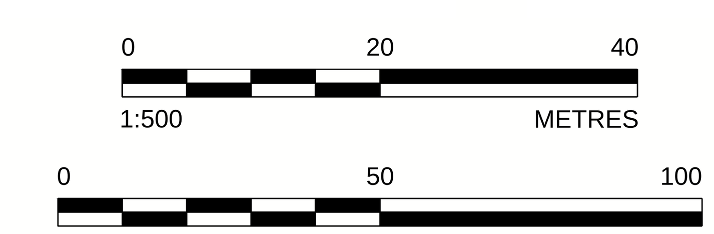


PLAN VIEW
SCALE 1:1,000



EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	202.86	205.83	208.04	206.93	204.52	203.87	206.06	211.05	213.48	212.36	213.51	215.15	214.93

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500



REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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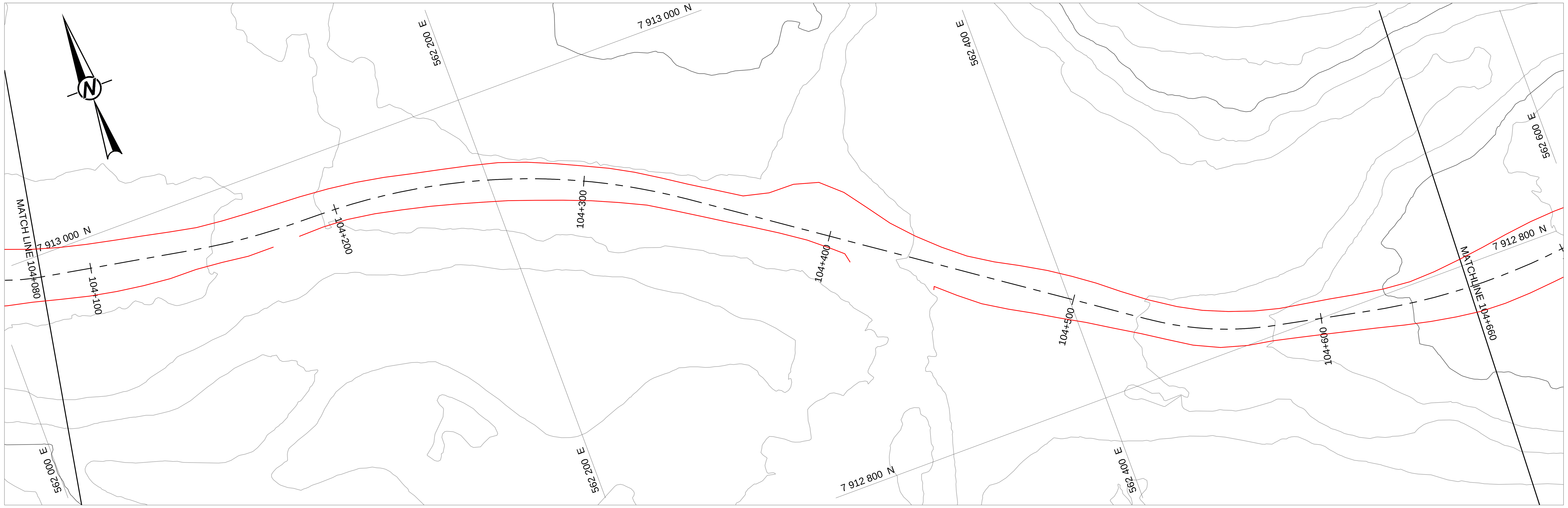
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 103+500 TO 104+080

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	3 of 17	003



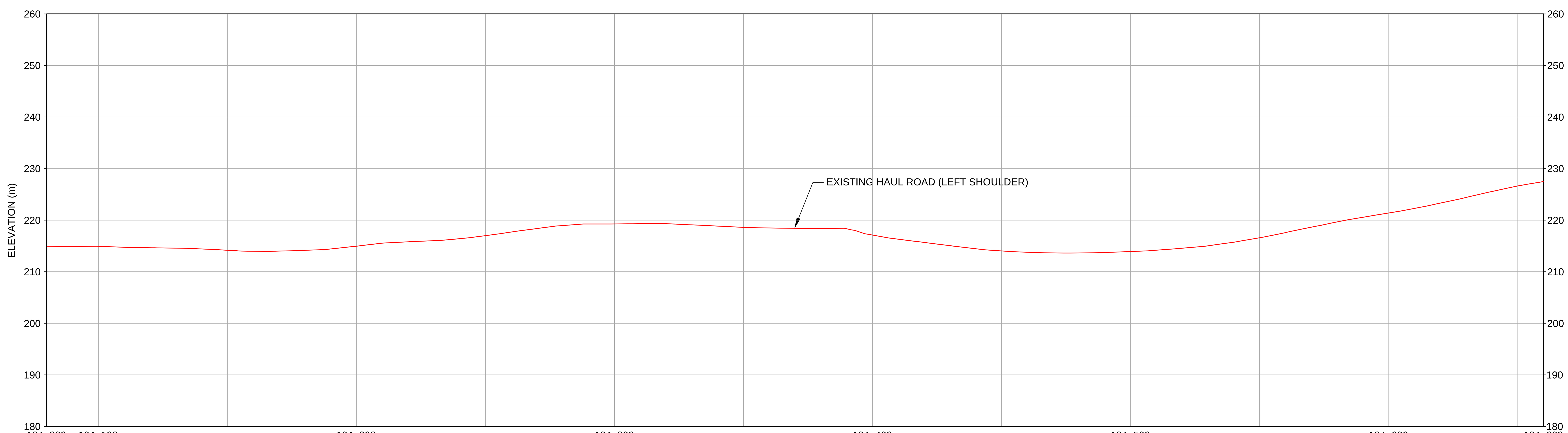
PLAN VIEW
SCALE 1:1,000

LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- AS-BUILT CULVERT LOCATION (2008)
- CV3 PIPE CROSSING

NOTES

1. THE POTENTIAL DRAINAGE SWALE WAS NOT CONSTRUCTED.
2. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
3. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
4. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.



EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	214.93	214.93	214.17	214.96	217.00	219.27	218.61	217.11	214.04	213.92	216.59	221.40	226.64	227.49

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500

Scale bars: 0 20 40 — 1:500 METRES; 0 50 100 — 1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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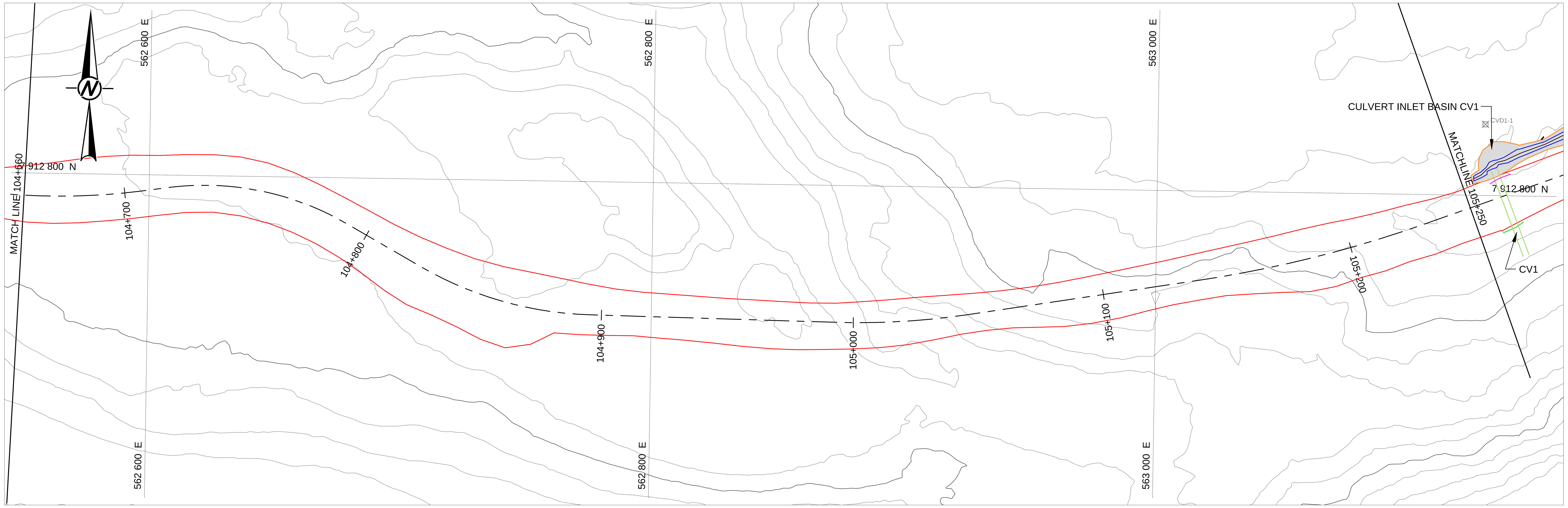
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 104+080 TO 104+660

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	4 of 17	004



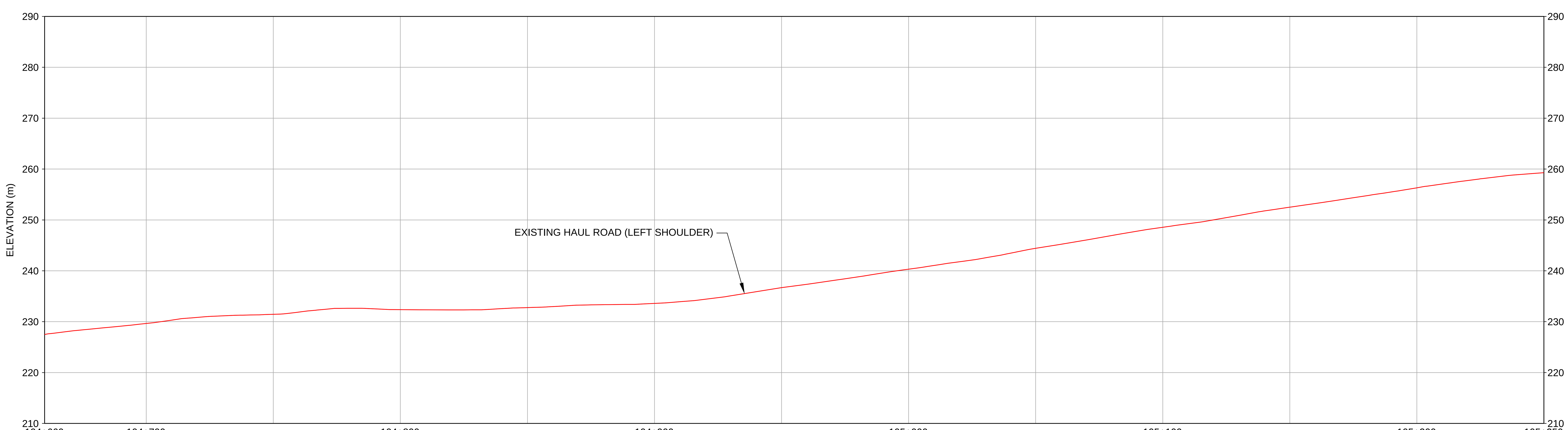
LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. THE POTENTIAL DRAINAGE SWALE WAS NOT CONSTRUCTED.
2. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
3. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
4. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.

PLAN VIEW
SCALE 1:1,000



EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	227.49	229.64	231.46	232.36	232.77	233.60	236.70	240.32	244.42	248.56	252.50	256.31	259.29

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500

0 20 40
1:500 METRES

0 50 100
1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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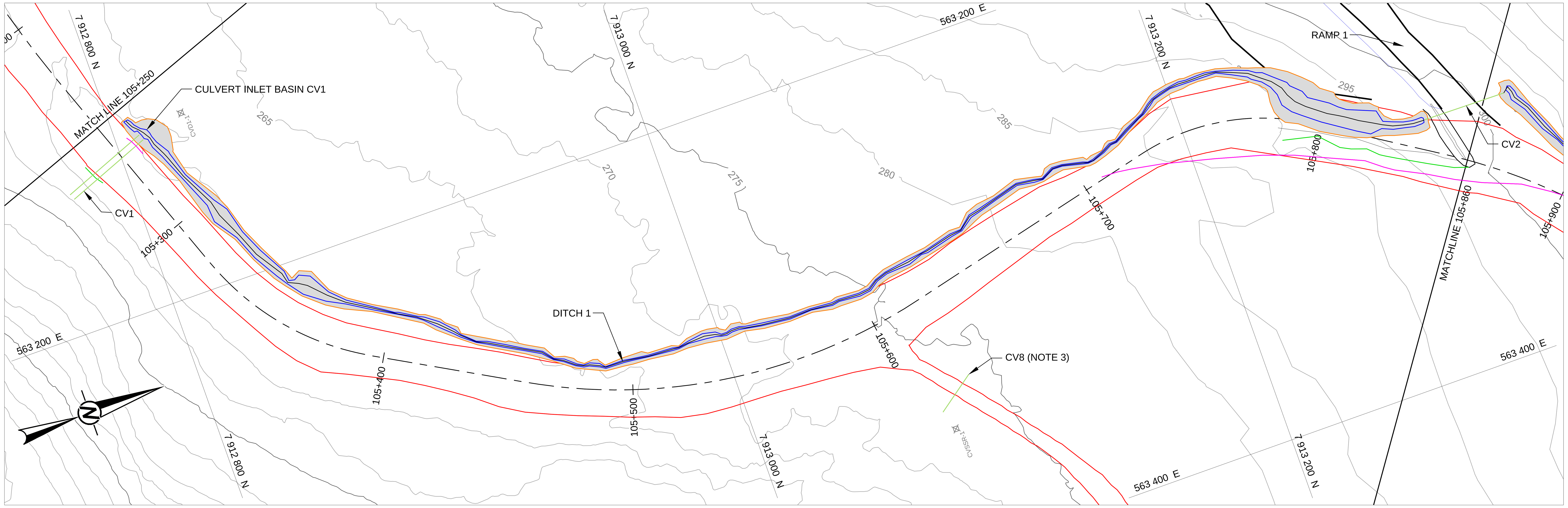
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 104+660 TO 105+250

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	5 of 17	005



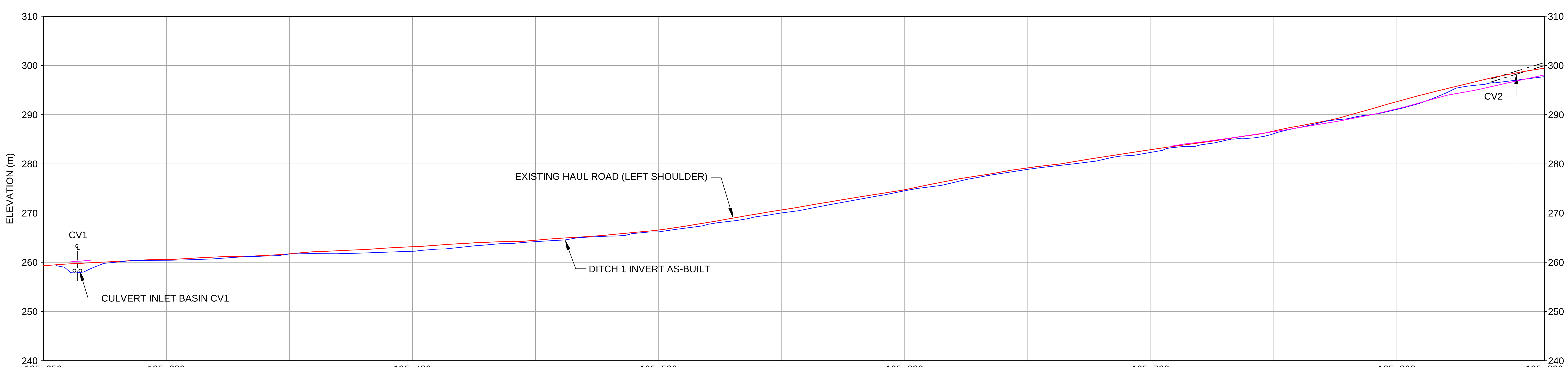
LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. DITCH AND PIPE CROSSING LAYOUT WAS ADJUSTED IN THE FIELD BASED ON THE ENCOUNTERED CONDITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
2. AS-BUILT POINTS FOR THE PIPE CROSSING ARE PROVIDED ON DWG. 014.
3. AN ADDITIONAL CULVERT (CV8) WAS INSTALLED IN THE MAG. ROAD.
4. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
5. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
6. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.

PLAN VIEW
SCALE 1:1,000



EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	259.49	259.68	259.82	260.57	261.71	263.17	264.48	266.55	270.64	274.75	279.19	282.88	286.68	292.65	298.64	299.46
DITCH INVERT AS-BUILT ELEVATION	259.33	257.88	258.03	260.42	261.69	262.23	264.19	266.17	270.04	274.54	278.88	282.34	286.15	291.07	297.11	297.73

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500

0 20 40
1:500 METRES

0 50 100
1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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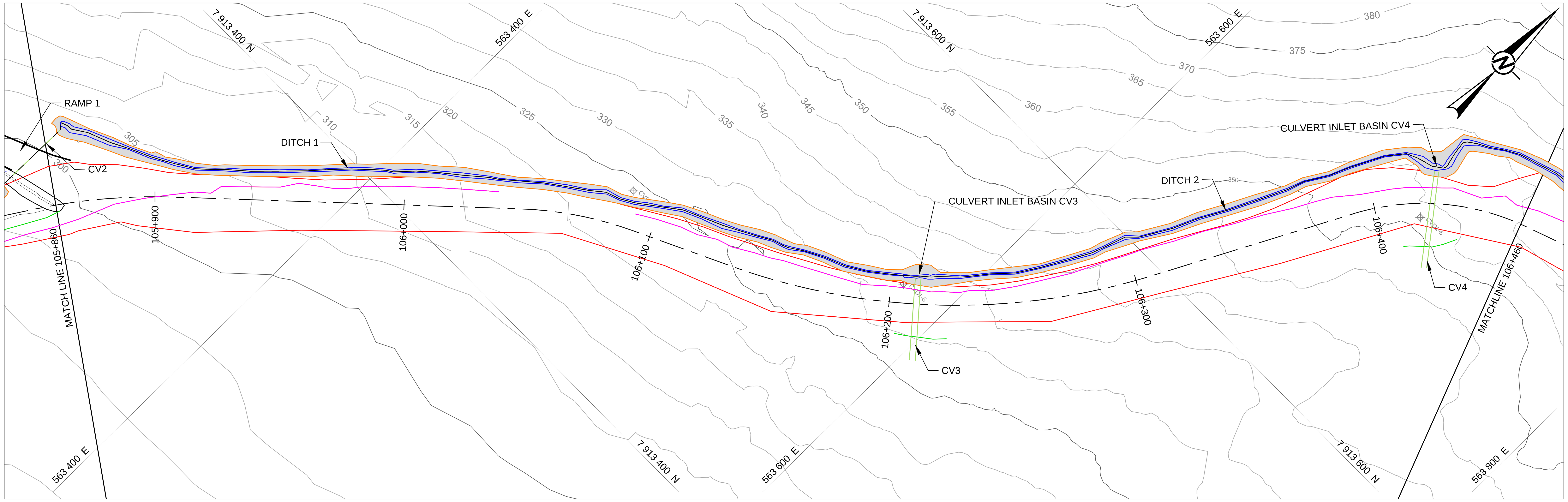
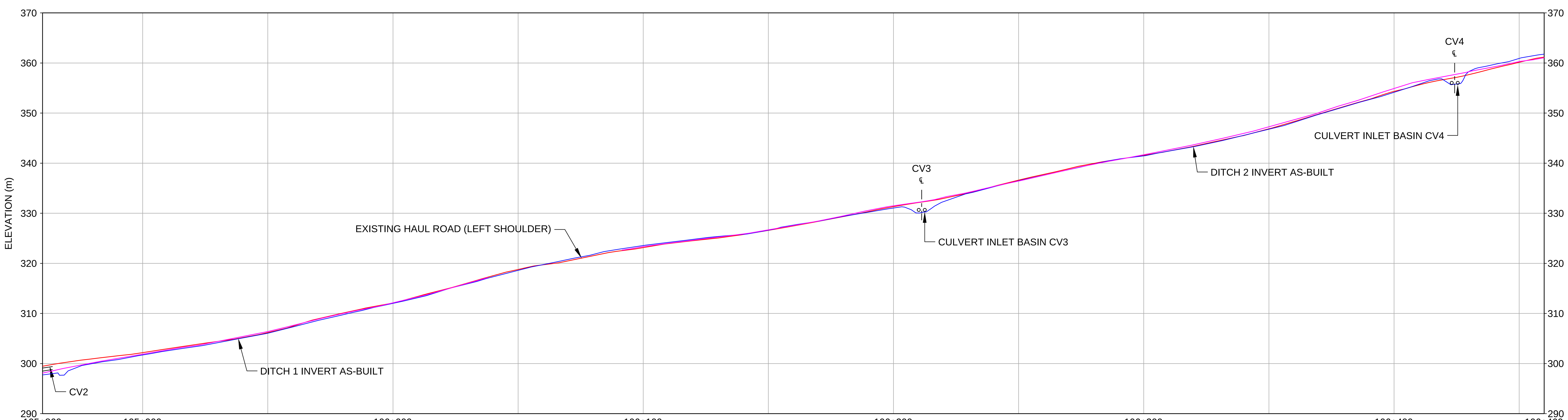
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 105+250 TO 105+860

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	6 of 17	006



PLAN VIEW
SCALE 1:1,000



EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	299.46	300.01	300.18	302.19	306.19	312.08	318.78	323.15	326.59	331.33	332.08	332.38	336.62	341.58	346.85	354.33	356.93	357.19	360.14	361.18
DITCH INVERT AS-BUILT ELEVATION	297.73	297.91	297.69	301.71	306.05	312.01	318.60	323.57	326.62	331.06	330.07	330.29	336.49	341.46	346.77	354.15	355.70	355.84	360.91	361.77

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500

LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- CVD1-8 AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. DITCH AND PIPE CROSSING LAYOUT WAS ADJUSTED BASED ON ENCOUNTERED FIELD CONDITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
2. AS-BUILT POINTS FOR THE PIPE CROSSING ARE PROVIDED ON DWG. 014.
3. RAMP 1 DITCH WAS NOT CONSTRUCTED.
4. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
5. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
6. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.

0 20 40
1:500 METRES

0 50 100
1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
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1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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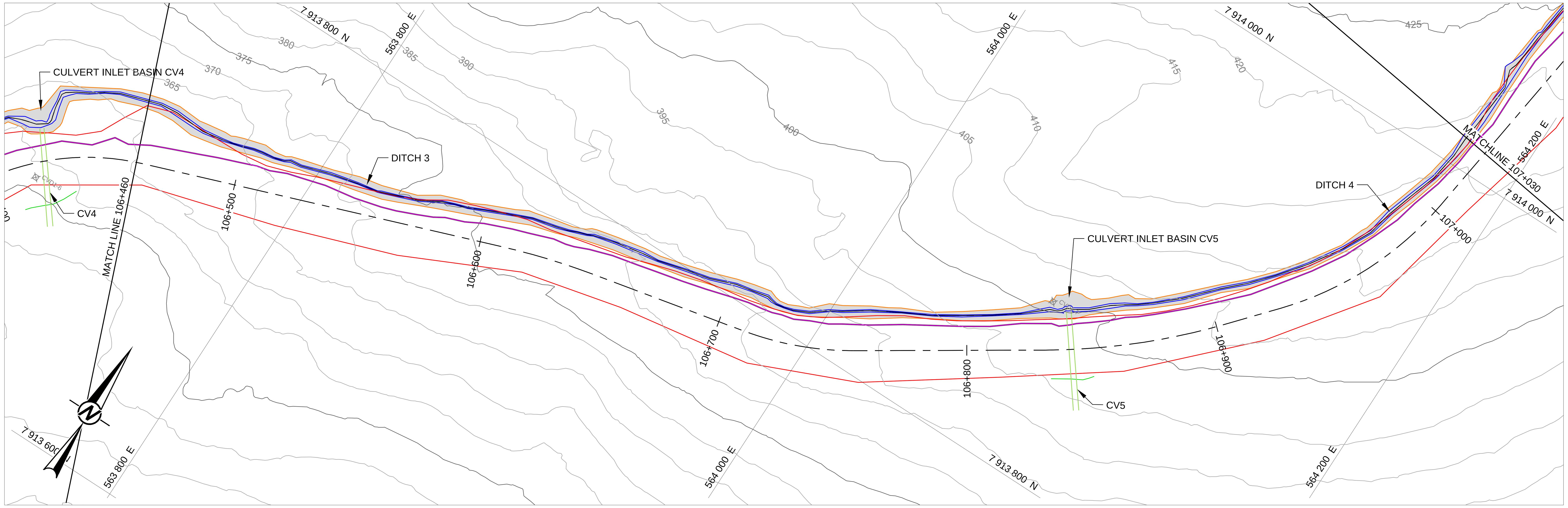
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 105+860 TO 106+460

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	7 of 17	007

25 mm
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Path: \\golder.gds\GAL\Mississauga\SIM\Clients\Baffinland_Iron_Mines_Corp\Baffin_Island\99_PROJ\1649295\40_PROD\0001_Water_Mgmt\ | File Name: 1649295-0001-CM-0007.dwg



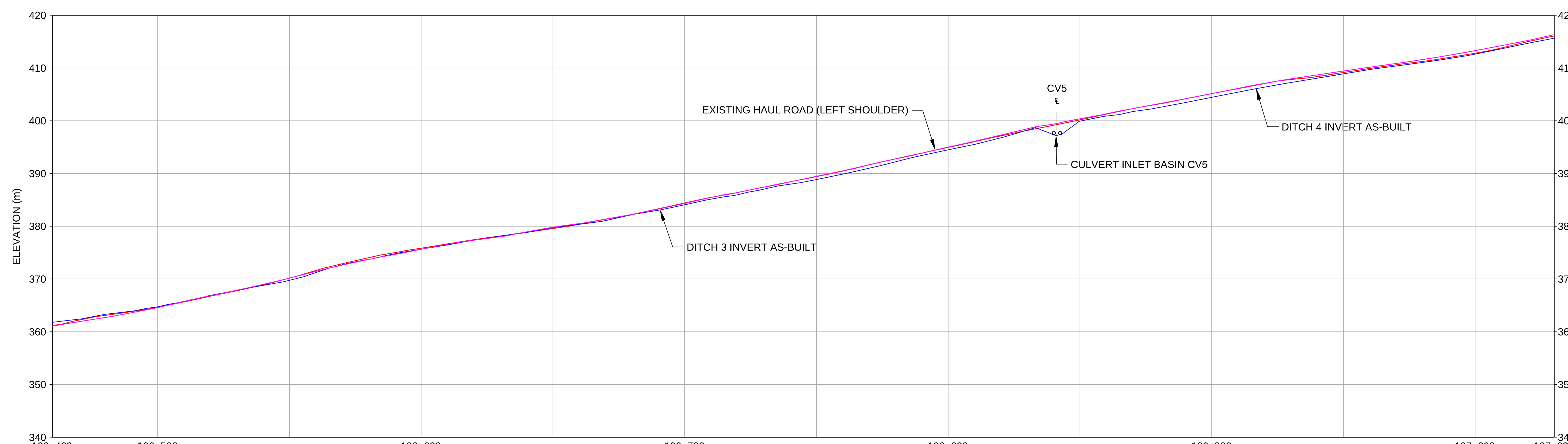
LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- CVD1-8 AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. DITCH AND PIPE CROSSING LAYOUT WAS ADJUSTED BASED ON ENCOUNTERED FIELD CONDITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
2. AS-BUILT POINTS FOR THE PIPE CROSSING ARE PROVIDED ON DWG. 014.
3. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
4. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
5. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.

PLAN VIEW
SCALE 1:1,000



EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	361.18	364.59	370.16	375.84	379.57	384.40	389.42	394.94	398.43	399.24	399.45	400.17	405.13	409.15	412.81	416.06
DITCH INVERT AS-BUILT ELEVATION	361.77	364.72	369.75	375.64	379.74	384.06	388.84	394.48	398.62	397.20	397.40	399.91	404.44	408.89	412.63	415.65

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500

0 20 40
1:500 METRES

0 50 100
1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
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0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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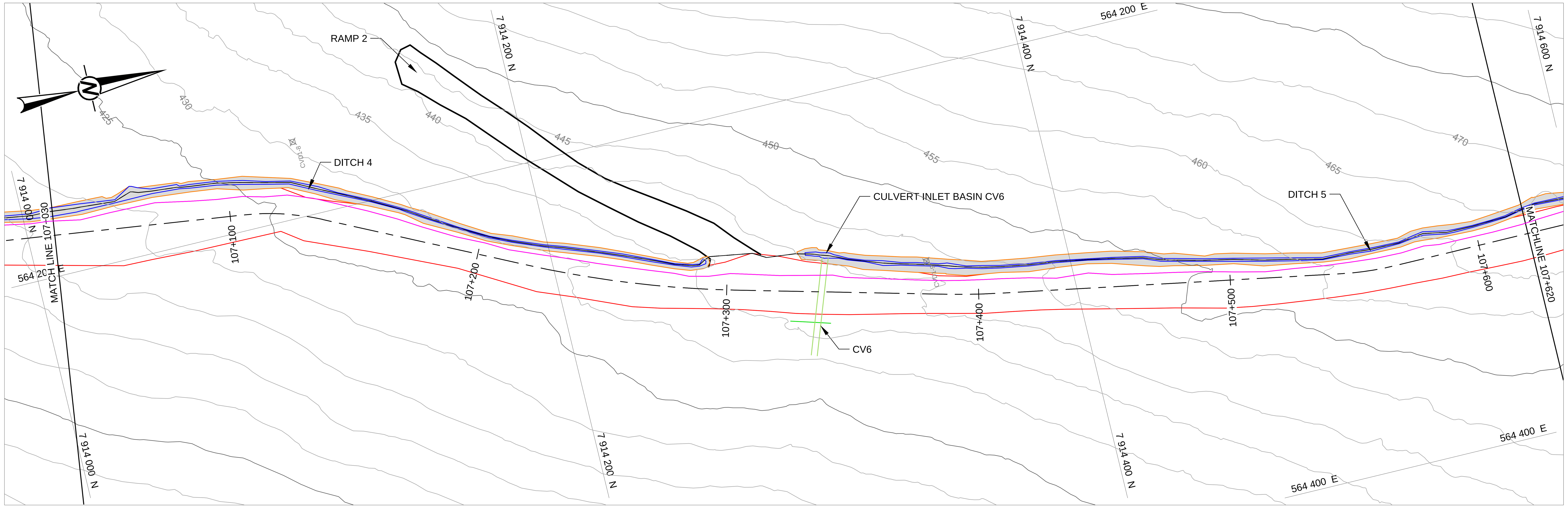
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 106+460 TO 107+030

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	8 of 17	008



PLAN VIEW

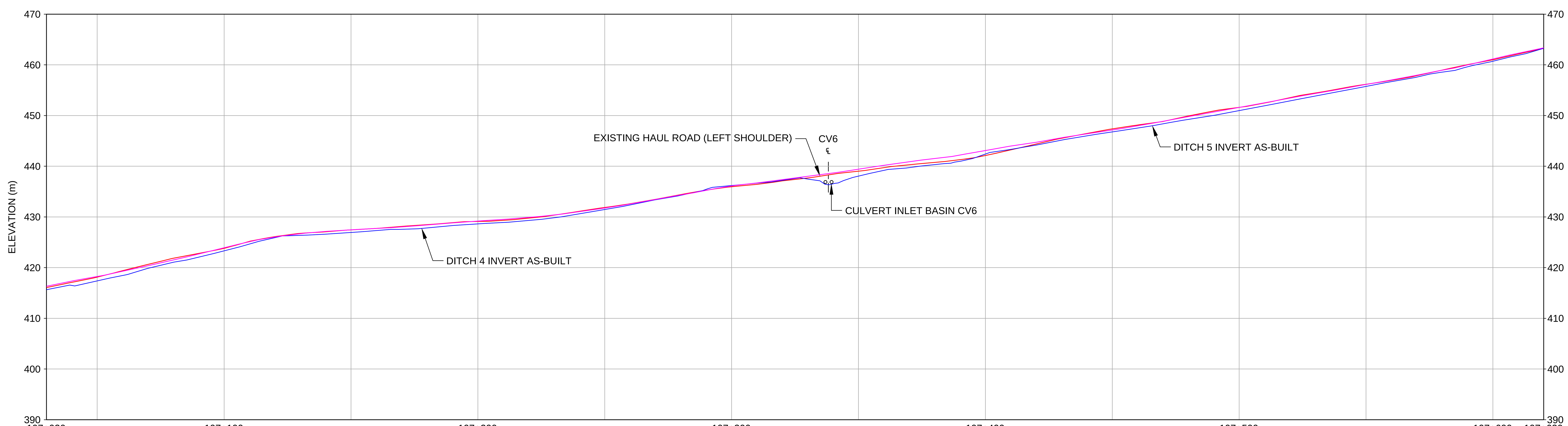
SCALE 1:1,000

LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. DITCH AND PIPE CROSSING LAYOUT WAS ADJUSTED BASED ON ENCOUNTERED FIELD CONDITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
2. AS-BUILT POINTS FOR THE PIPE CROSSING ARE PROVIDED ON DWG. 014.
3. RAMP 2 DITCH WAS NOT CONSTRUCTED.
4. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
5. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
6. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.



EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	416.06	418.12	423.80	427.45	429.10	431.86	435.96	437.54	438.29	438.59	439.02	442.13	447.38	451.61	456.16	461.01	463.25
DITCH INVERT AS-BUILT ELEVATION	415.65	417.38	423.31	426.94	428.63	431.47	436.18	437.67	436.34	436.70	438.06	442.41	446.77	450.97	455.74	460.72	463.21

PROFILE VIEW

H SCALE 1:1,000
V SCALE 1:500

0 20 40 1:500 METRES

0 50 100 1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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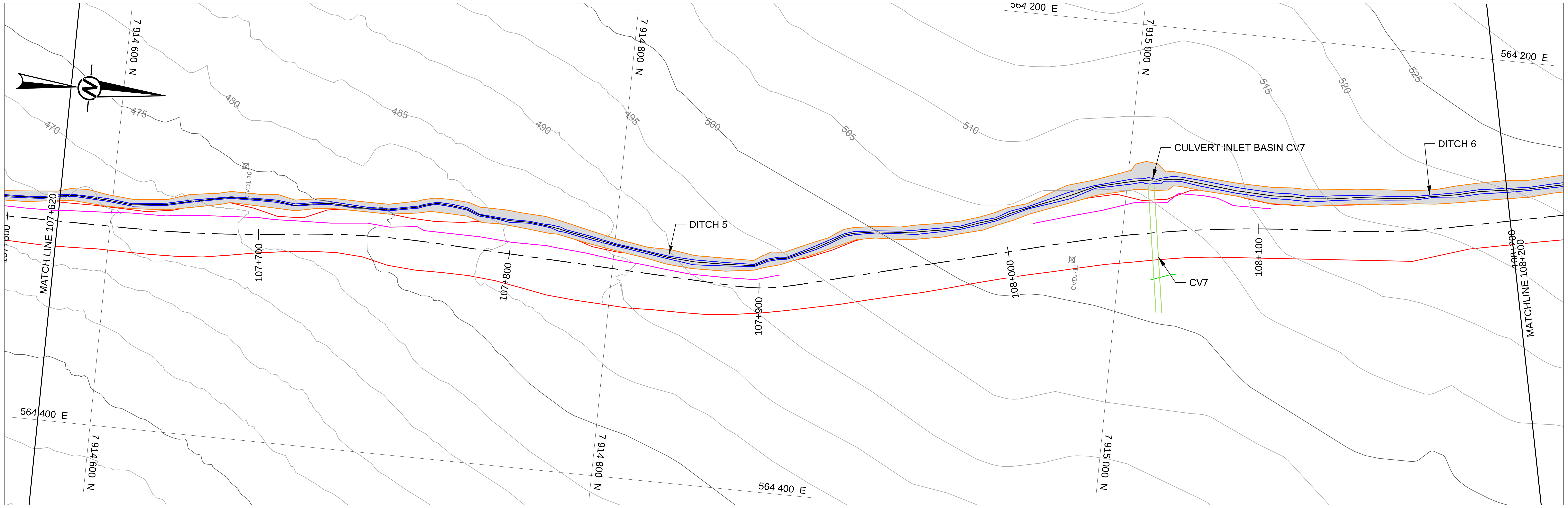
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 107+030 TO 107 + 620

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	9 of 17	009



PLAN VIEW

SCALE 1:1,000

LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- CVD1-8 AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. DITCH AND PIPE CROSSING LAYOUT WAS ADJUSTED BASED ON ENCOUNTERED FIELD CONDITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
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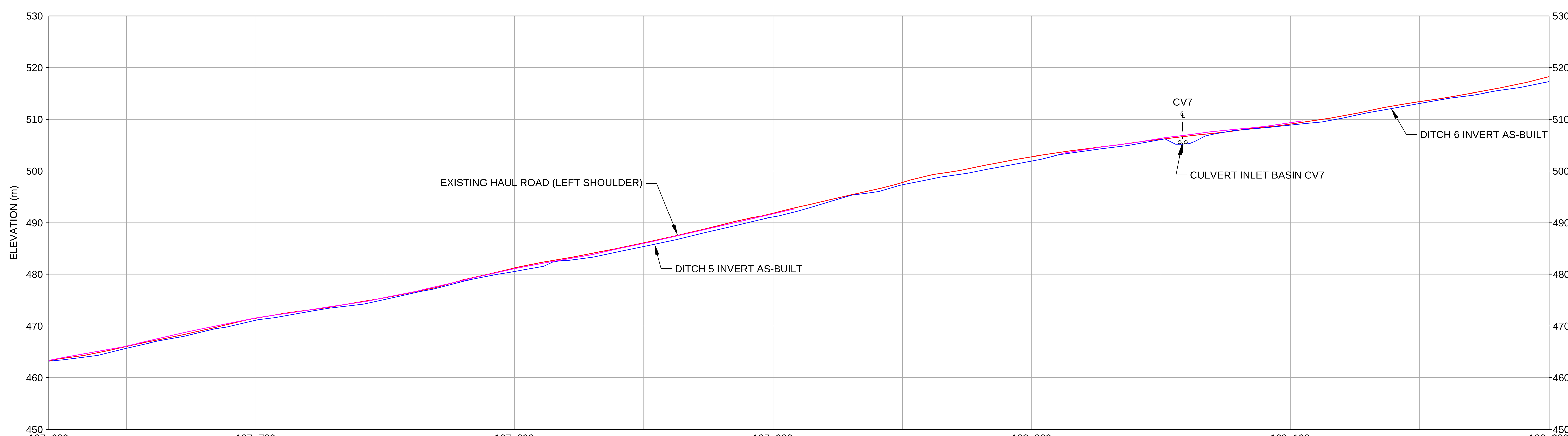

EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	463.25	466.06	471.50	475.48	481.23	486.10	491.81	497.78	502.75	506.13	506.47	506.79	507.13	509.09	513.44	518.24
DITCH INVERT AS-BUILT ELEVATION	463.21	465.69	471.12	475.16	480.53	485.39	491.09	497.34	501.93	506.07	505.16	505.28	506.76	508.88	513.09	517.30

PROFILE VIEW

H SCALE 1:1,000
V SCALE 1:500

0 20 40
1:500 METRES

0 50 100
1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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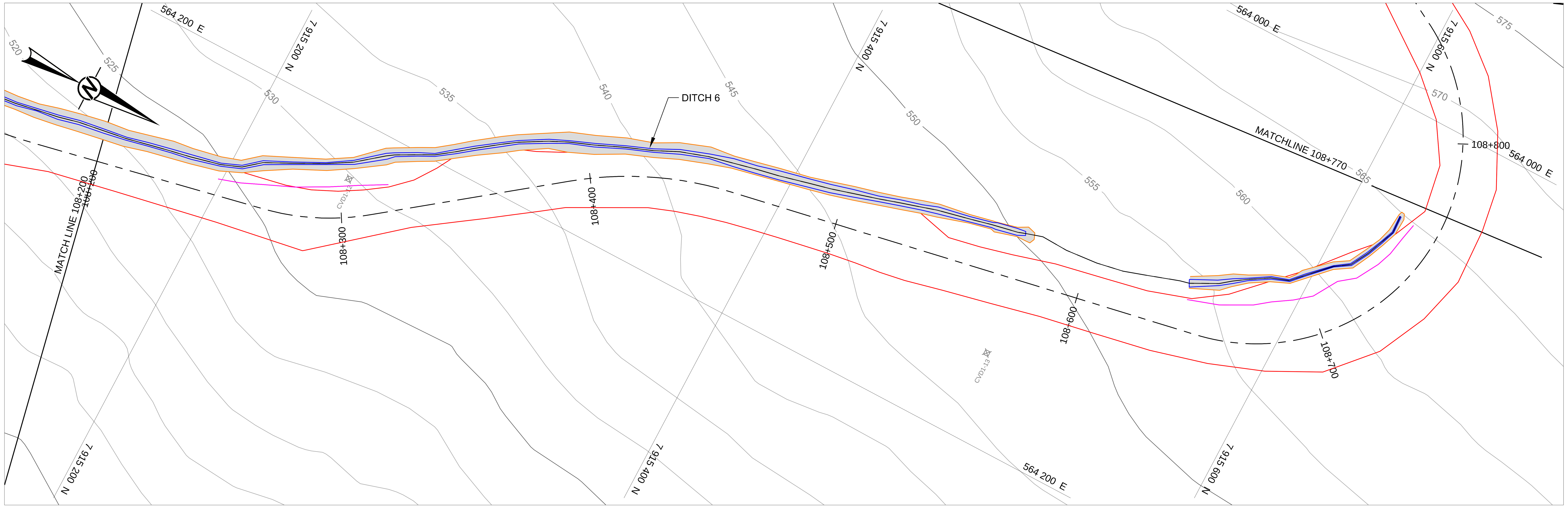
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 107+620 TO 108+200

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	10 of 17	010



LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. DITCH AND PIPE CROSSING LAYOUT WAS ADJUSTED BASED ON ENCOUNTERED FIELD CONDITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
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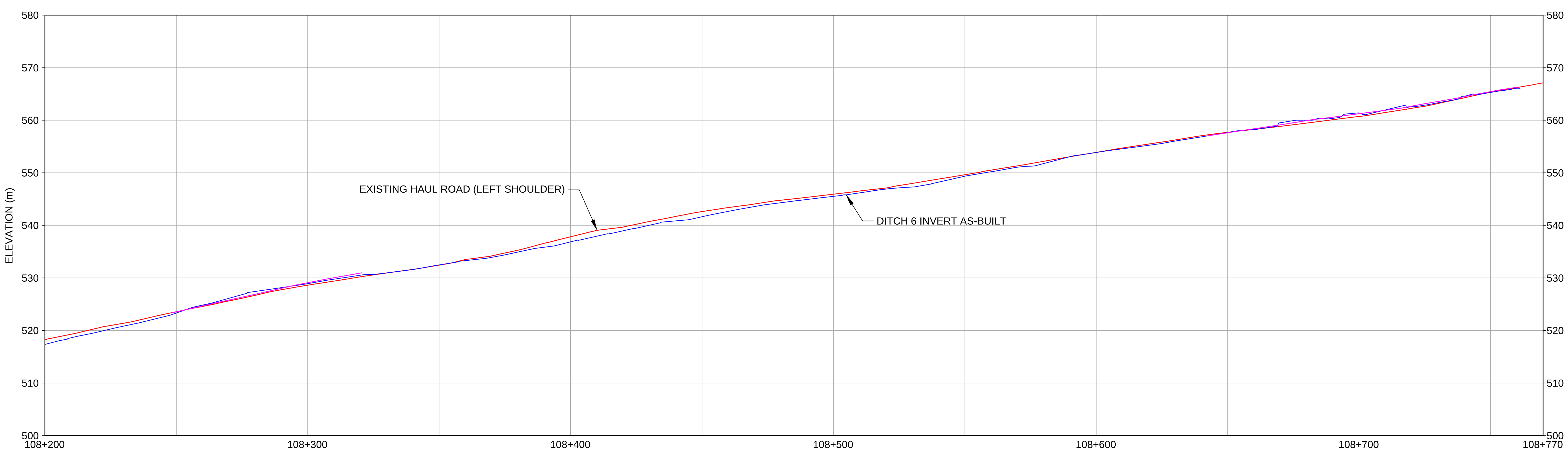
PLAN VIEW
SCALE 1:1,000



EXISTING HAUL ROAD LEFT SHOULDER ELEVATION	518.24	523.57	528.62	532.43	537.83	542.63	545.93	549.64	553.90	557.71	560.72	565.32	566.35
DITCH INVERT AS-BUILT ELEVATION	517.34	523.32	528.91	532.48	536.86	541.64	545.51	549.36	553.86	557.68	561.39	565.28	566.09

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500

0 20 40
1:500 METRES

0 50 100
1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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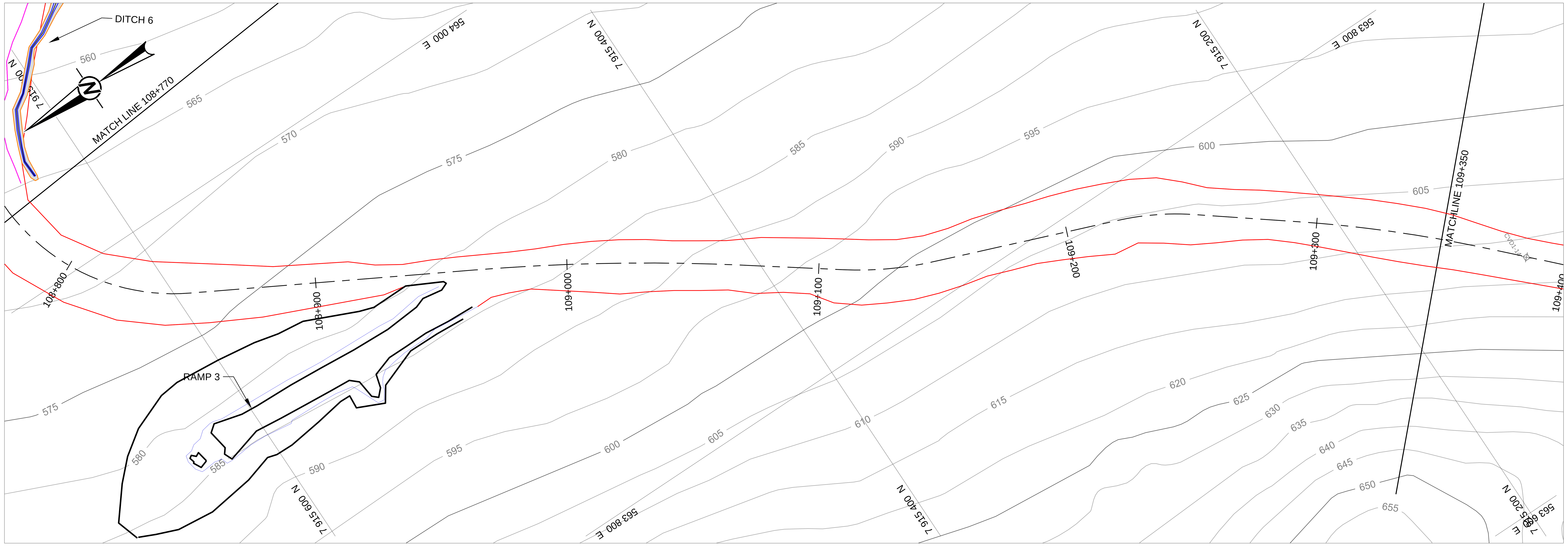
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 108+200 TO 108+770

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	11 of 17	011



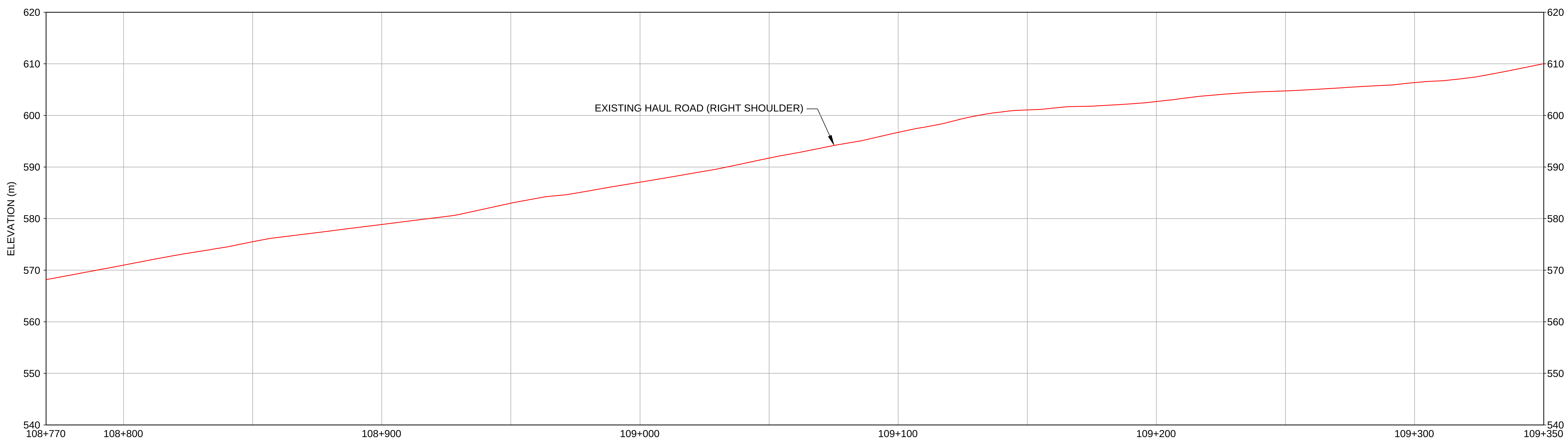
PLAN VIEW
SCALE 1:1,000

LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. DITCH 7 WAS NOT CONSTRUCTED.
2. RAMP 3 DITCH WAS NOT CONSTRUCTED.
3. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
4. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
5. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.



EXISTING HAUL ROAD RIGHT SHOULDER ELEVATION	568.17	570.98	575.52	578.86	582.99	587.05	591.72	596.70	601.07	602.69	604.75	606.37	610.02

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500

0 20 40
1:500 METRES

0 50 100
1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PLAN AND PROFILE STA 108+770 TO 109+350

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	12 of 17	012

LEGEND

- ORIGINAL GROUND SURFACE (2008)
- EXISTING ROAD SHOULDER
- DITCH
- 108+000 — ROAD CENTRELINE AND STATIONING (APPROXIMATE)
- AS-BUILT CULVERT LOCATION (2008)
- PIPE CROSSING
- SURVEY EXISTING ROAD SHOULDER
- TOE BERM

NOTES

1. DITCH 7 WAS NOT CONSTRUCTED.
2. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
3. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
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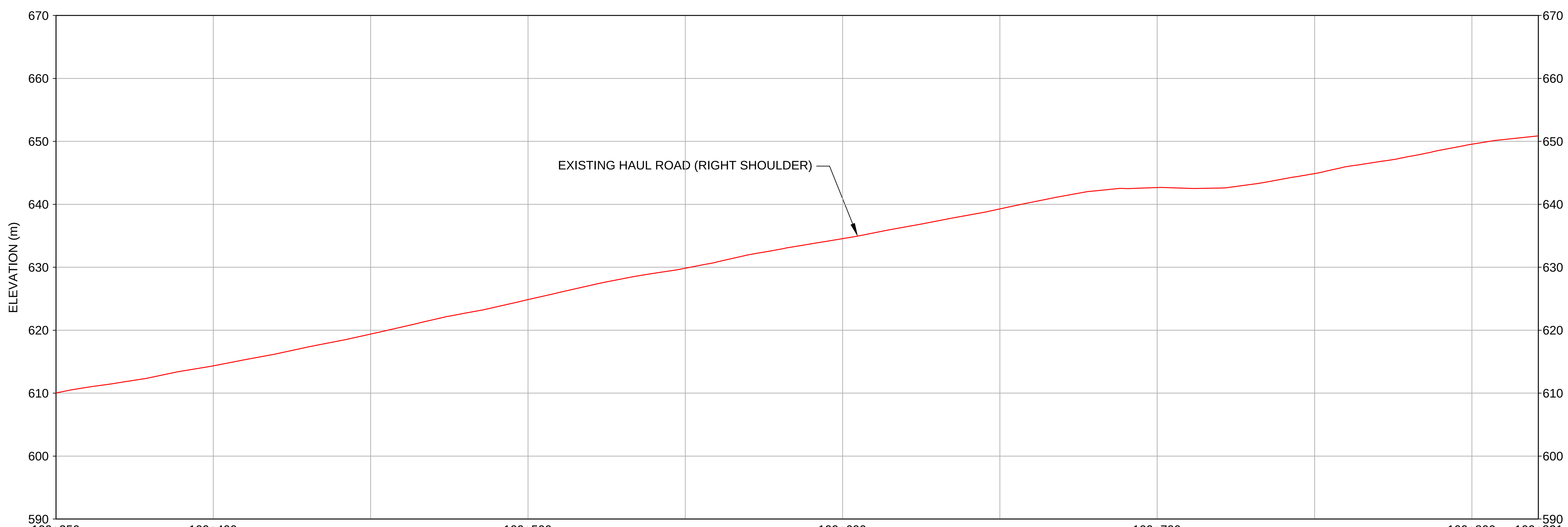
PLAN VIEW
SCALE 1:1,000



EXISTING HAUL ROAD RIGHT SHOULDER ELEVATION	610.02	614.33	619.38	624.86	629.85	634.54	639.26	642.67	644.87	649.54	650.88

PROFILE VIEW
H SCALE 1:1,000
V SCALE 1:500

0 20 40
1:500 METRES

0 50 100
1:1,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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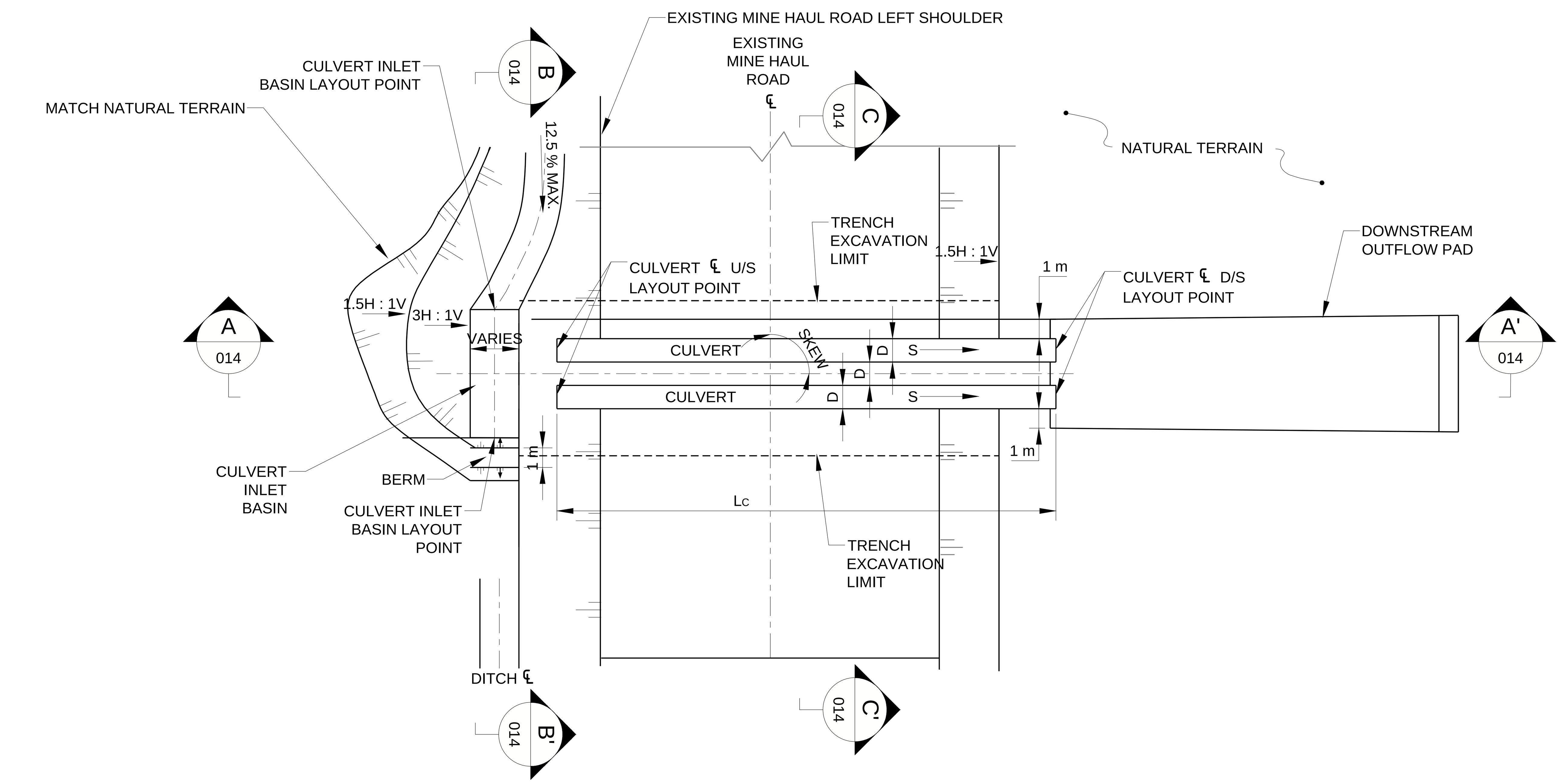
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

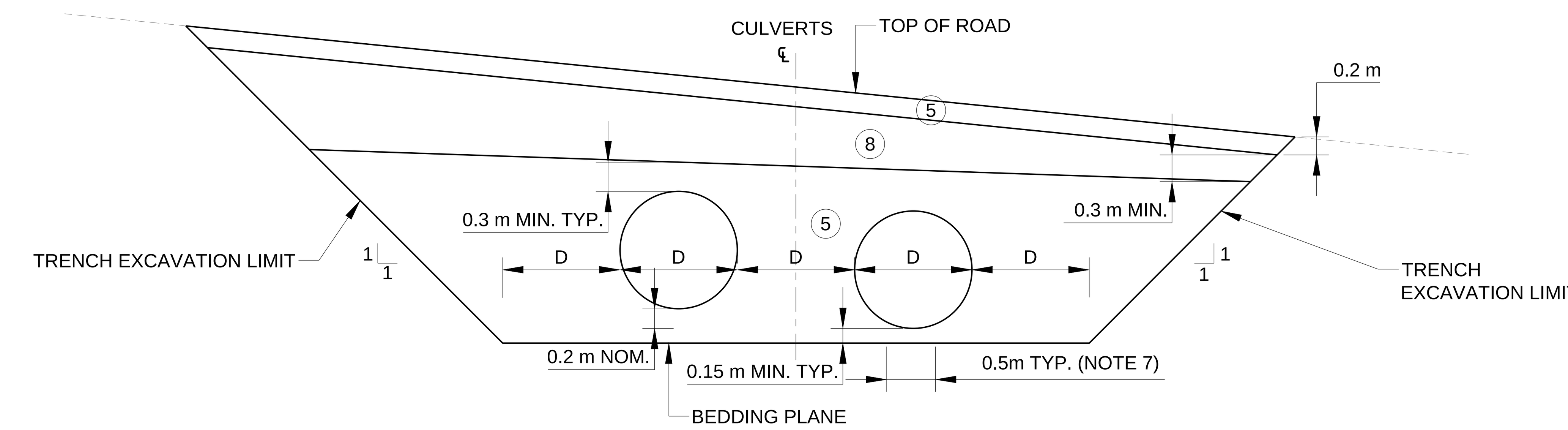
TITLE
PLAN AND PROFILE STA 109+350 TO 109+821

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	13 of 17	013



TYPICAL PIPE CROSSING PLAN VIEW

SCALE 1:200



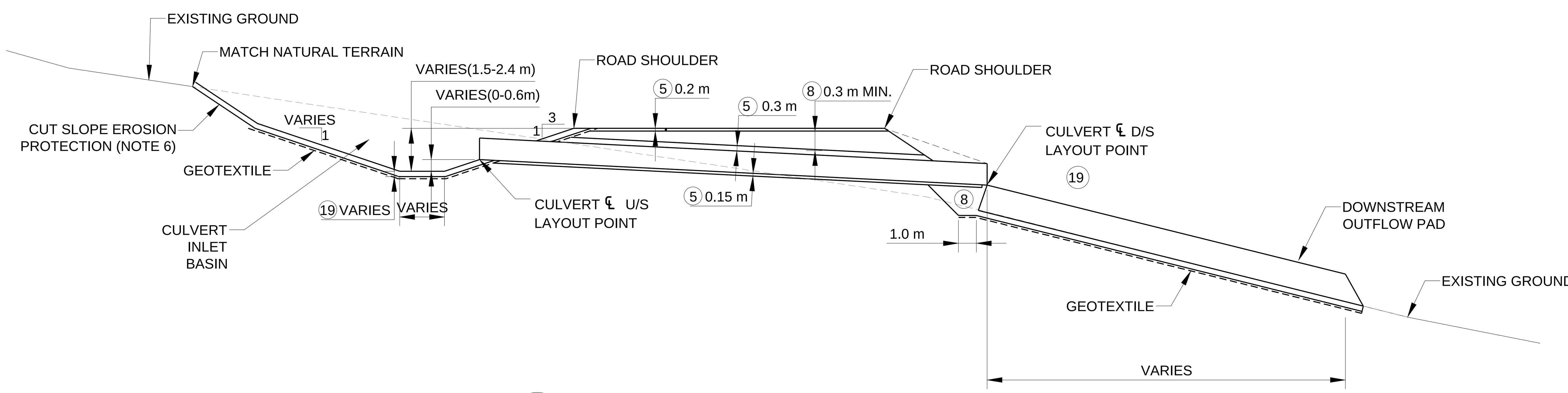
SCALE 1:50 C 014 TYPICAL PIPE CROSSING SECTION

LEGEND

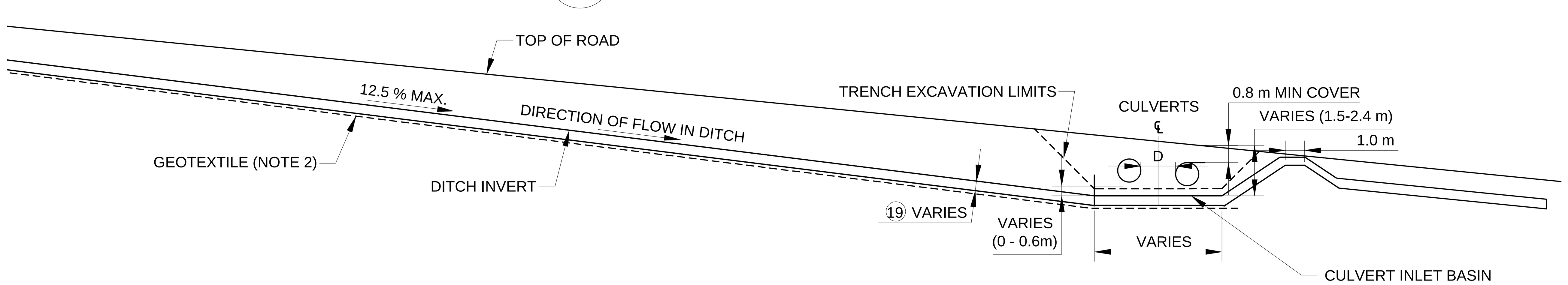
- (5) SCREENED MATERIAL
- (8) JAW RUN
- (19) EROSION PROTECTION (NOTE 9)

NOTES

1. PIPE CROSSING LAYOUT WAS ADJUSTED BASED ON ENCOUNTERED FIELD CONDITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
2. GEOTEXTILE WAS PLACED IN ALL INLET BASINS AND OUTFLOW PADS EXCEPT AT CV2.
3. THE INLET BASINS WERE NOT CONSTRUCTED TO DESIGN DIMENSIONS DUE TO THE FROZEN GROUND CONDITIONS.
4. NO SURVEY INFORMATION WAS PROVIDED FOR THE DOWNSTREAM OUTFLOW PADS.
5. NO SURVEY INFORMATION WAS PROVIDED FOR THE BACKFILL LAYERS. LAYER THICKNESS WAS OBSERVED BY THE OWNER'S REPRESENTATIVE IN THE FIELD.
6. CULVERT SKEW WAS ADJUSTED BY THE OWNER'S REPRESENTATIVE BASED ON ENCOUNTERED FIELD CONDITIONS.
7. BEDDING WAS SHAPED TO RECEIVE THE PIPE.
8. IT IS RECOMMENDED THAT EROSION PROTECTION OF THE DOWNSTREAM OUTFLOW PAD BE EXTENDED TO A WATER BODY CAPABLE OF CONVEYING THE CONCENTRATED FLOW TO PREVENT EROSION OF THE NATURAL SOILS.
9. THE EROSION PROTECTION ROCK SIZE IS SMALLER THAN REQUIRED FOR THE SELECTED 1:10 YEAR DESIGN FLOW. THIS IN IN RECOGNITION OF THE AVAILABLE MATERIAL AND AT THE OWNER'S REQUEST. RIPRAP BLOCKS COULD MOBILIZE EVEN DURING FREQUENT FLOOD EVENTS, WHICH MIGHT IMPACT SIGNIFICANTLY THE OPERATION OF THE DRAINAGE SYSTEM. REGULAR MAINTENANCE WILL BE REQUIRED. FUTURE IMPROVEMENTS (I.E. REPLACEMENT OF EROSION PROTECTION WITH MATERIAL WITH LARGER ROCK SIZES, PLACEMENT OF GABION MATS) ARE RECOMMENDED.
10. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
11. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
12. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.



SCALE 1:200 A 014 TYPICAL PIPE CROSSING PROFILE



SCALE 1:200 B 014 TYPICAL CULVERT INLET BASIN PROFILE

CULVERT SCHEDULE

CULVERT ID	FISH BEARING (Y/N)	NUMBER OF PIPES	DIAMETER, D (mm)	LENGTH L_c, (m)	TYPE	CULVERT CL LAYOUT AT UPSTREAM			CULVERT CL LAYOUT AT DOWNSTREAM			SLOPE, S (%)	SKEW (°)
						NORTHING	EASTING	U/S INV. ELEV. (m)	NORTHING	EASTING	D/S INV. ELEV. (m)		
CV1	N	2	1000	36.0	CSP	7912810.6	563134.8	258.47	7912776.9	563147.9	256.62	5%	90
						7912809.7	563132.5	258.26	7912775.9	563145.7	256.43	5%	
CV2	N	1	1200	33.0	CSP	7913325.4	563298.6	298.12	7913292.0	563298.1	296.46	5%	-
CV3	N	2	1000	33.0	CSP	7913529.4	563583.7	330.34	7913503.1	563603.7	328.48	6%	88
						7913527.8	563582.0	330.11	7913504.6	563605.5	328.68	4%	
CV4	N	2	1000	39.0	CSP	7913707.4	563699.0	356.04	7913675.4	563721.5	353.80	6%	96
						7913706.3	563697.8	355.78	7913676.7	563723.2	353.96	5%	
CV5	N	2	1000	39.0	CSP	7913867.3	564079.1	397.64	7913837.5	564104.3	395.86	5%	97
						7913868.5	564080.5	397.79	7913836.2	564102.5	395.66	5%	
CV6	N	2	1200	39.0	CSP	7914306.9	564264.9	436.40	7914291.3	564300.7	434.30	5%	97
						7914304.6	564264.0	436.20	7914293.5	564301.6	434.50	4%	
CV7	N	2	1200	51.0	CSP	7915008.2	564263.1	504.96	7915018.7	564313.2	502.65	5%	92
						7915010.5	564262.8	505.12	7915016.5	564313.4	502.41	5%	
CV8	N	2	500	18.0	CSP	7913087.9	563332.5	274.52	7913073.2	563343.2	273.50	6%	-

0 2 4
1:50 METRES

0 10 20
1:200 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
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1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
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A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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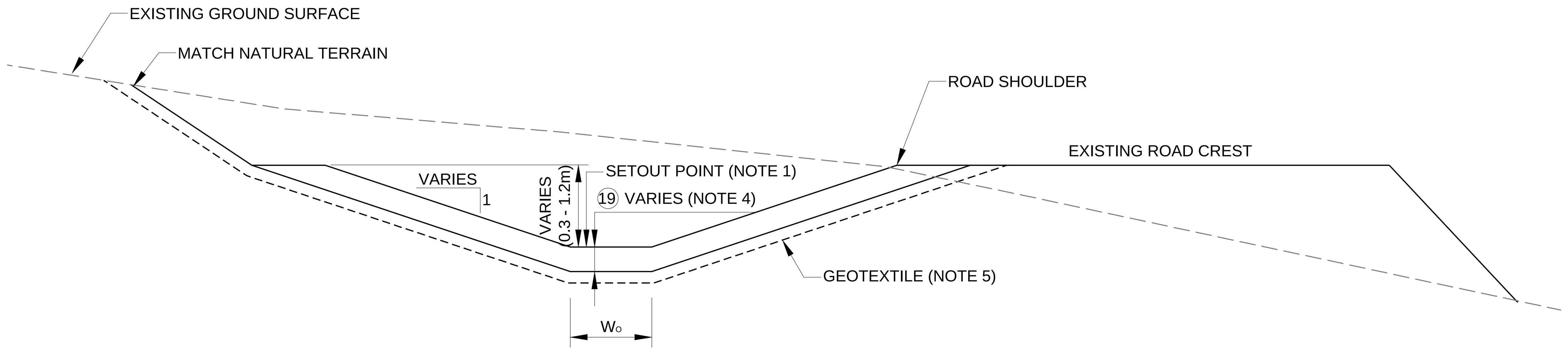
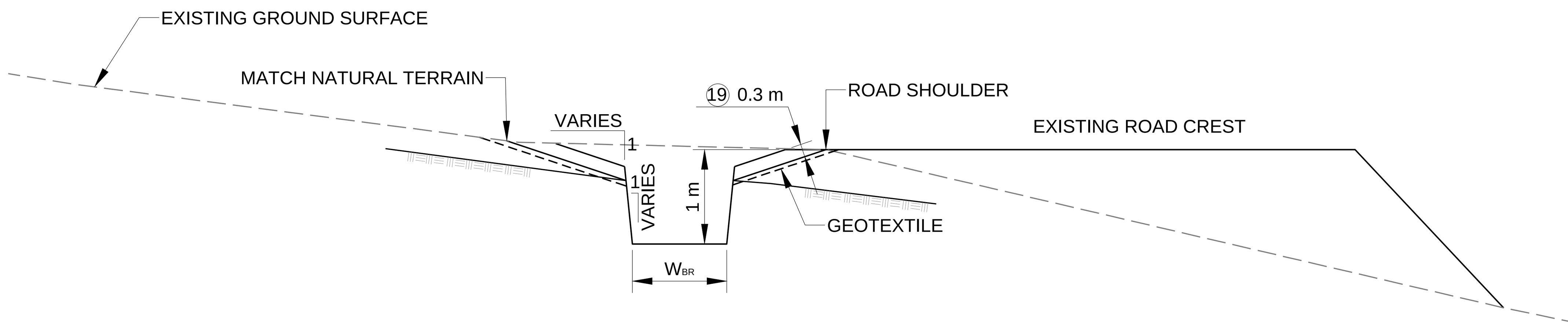
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
PIPE CROSSING TYPICAL DETAILS AND CULVERT SCHEDULE

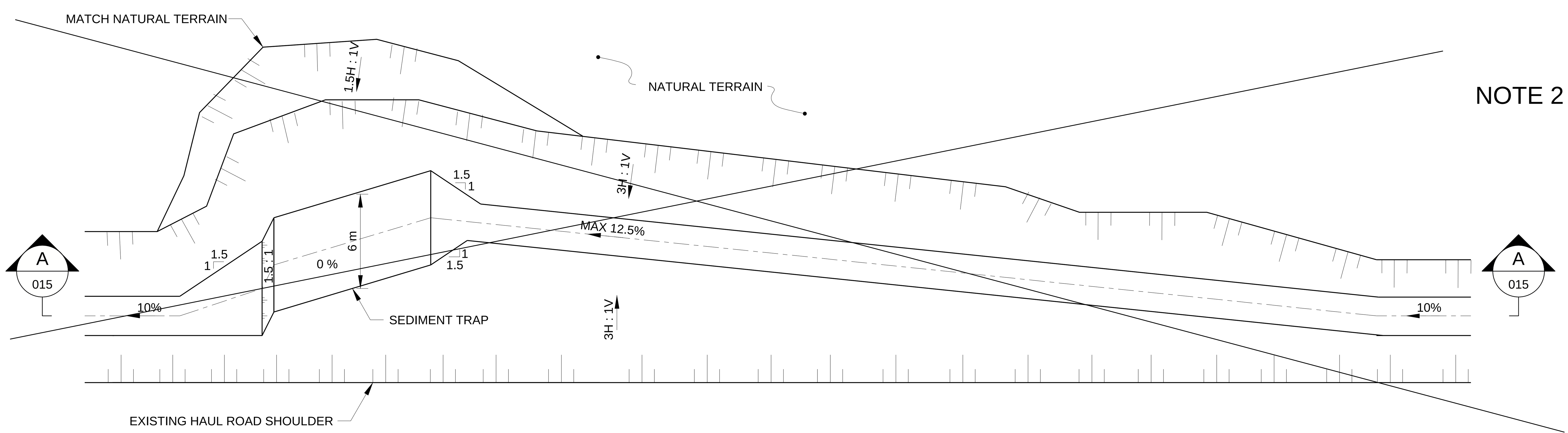
PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	14 of 17	014



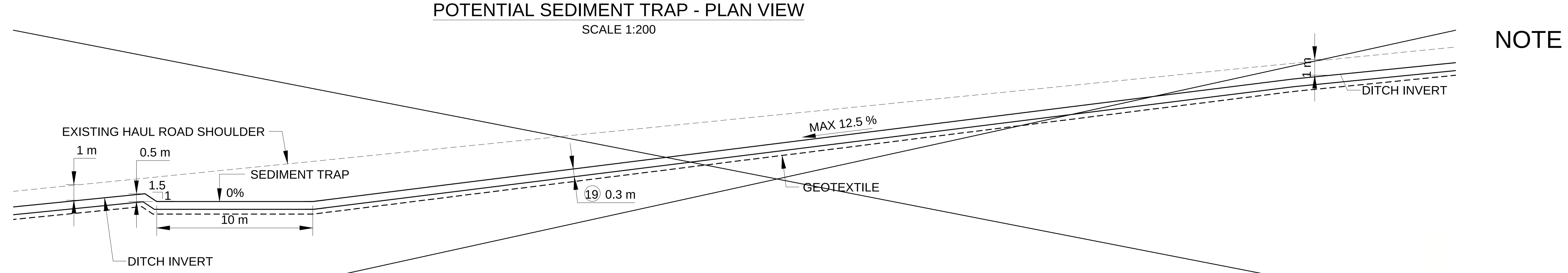
TYPICAL DITCH CROSS-SECTION (OVERBURDEN)
SCALE 1:50



TYPICAL DITCH CROSS-SECTION (ROCK CUT)
SCALE 1:50



POTENTIAL SEDIMENT TRAP - PLAN VIEW
SCALE 1:200



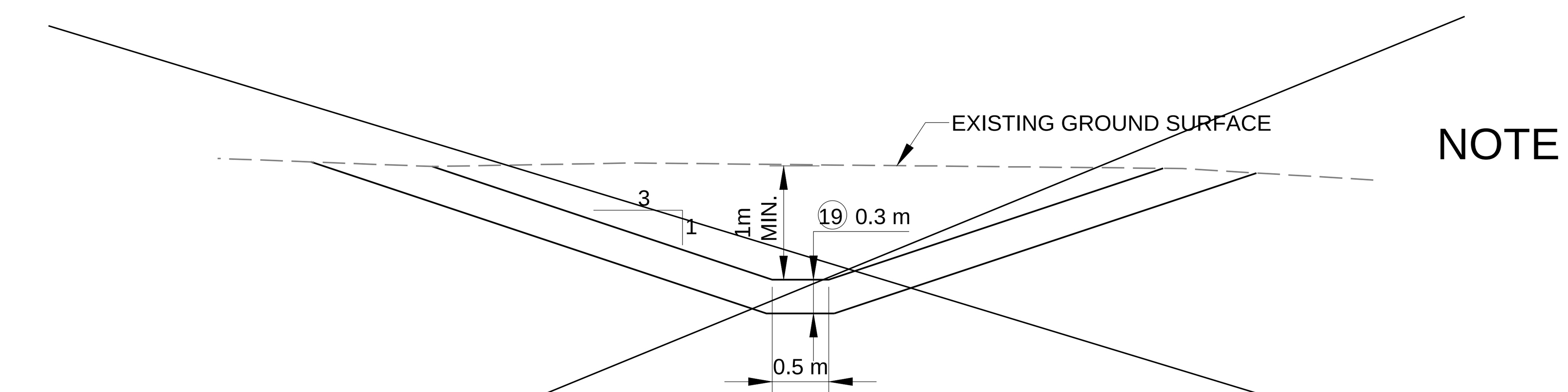
SCALE 1:200 A 015 POTENTIAL SEDIMENT TRAP

LEGEND

19 EROSION PROTECTION (NOTE 8)

NOTES

1. DITCH LAYOUT WAS ADJUSTED BASED ON ENCOUNTERED FIELD CONDITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
2. THE POTENTIAL SEDIMENT TRAPS WERE NOT CONSTRUCTED IN THIS CONSTRUCTION PHASE.
3. THE POTENTIAL DRAINAGE SWALE WAS NOT CONSTRUCTED IN THIS CONSTRUCTION PHASE.
4. THE CONFIGURATION AND THE EROSION PROTECTION THICKNESS VARIED FROM DESIGN FOR THE DITCH DUE TO THE ENCOUNTERED FIELD CONDITIONS.
5. GEOTEXTILE WAS PLACED IN STEEP SECTIONS OF THE DITCH.
6. RANGE OF BASE WIDTH BASED ON AS-BUILT CROSS-SECTIONS SPACED AT 50 m.
7. DITCH 7, RAMP 1 DITCH, RAMP 2 DITCH AND RAMP 3 DITCH WERE NOT CONSTRUCTED IN THIS CONSTRUCTION PHASE.
8. THE EROSION PROTECTION ROCK SIZE IS SMALLER THAN REQUIRED FOR THE SELECTED 1:10 YEAR DESIGN FLOW. THIS IN IN RECOGNITION OF THE AVAILABLE MATERIAL AND AT THE OWNER'S REQUEST. RIPRAP BLOCKS COULD MOBILIZE EVEN DURING FREQUENT FLOOD EVENTS, WHICH MIGHT IMPACT SIGNIFICANTLY THE OPERATION OF THE DRAINAGE SYSTEM. REGULAR MAINTENANCE WILL BE REQUIRED. FUTURE IMPROVEMENTS (I.E. REPLACEMENT OF EROSION PROTECTION WITH MATERIAL WITH LARGER ROCK SIZES, PLACEMENT OF GABION MATS) ARE RECOMMENDED.
9. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
10. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
11. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.



TYPICAL POTENTIAL DRAINAGE SWALE CROSS-SECTION
SCALE 1:50

DITCH DETAILS (NOTE 6)

DITCH ID	START STATION	END STATION	BASE WIDTH (m)
DITCH 1	105+277	106+209	0.5 - 4
DITCH 2	106+209	106+503	1.2 - 2.9
DITCH 3	106+503	106+836	1.7 - 2.0
DITCH 4	106+836	107+287	1.5 - 1.6
DITCH 5	107+339	108+035	1.0 - 1.5
DITCH 6	108+035	108+745	1.0 - 2.4
DITCH 7	NOT CONSTRUCTED		
RAMP 1 DITCH	NOT CONSTRUCTED		
RAMP 2 DITCH	NOT CONSTRUCTED		
RAMP 3 DITCH	NOT CONSTRUCTED		

0 2 4
1:50 METRES

0 10 20
1:200 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2016-07-15	AS-BUILT - PHASE 1 CONSTRUCTION	FZG	MJT	MJT	PMB
1	2016-04-15	REVISED - MINE HAUL ROAD AS-BUILT	FZG	MJT	MJT	PMB
0	2016-04-01	ISSUED FOR CONSTRUCTION	FZG	MJT	MJT	PMB
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

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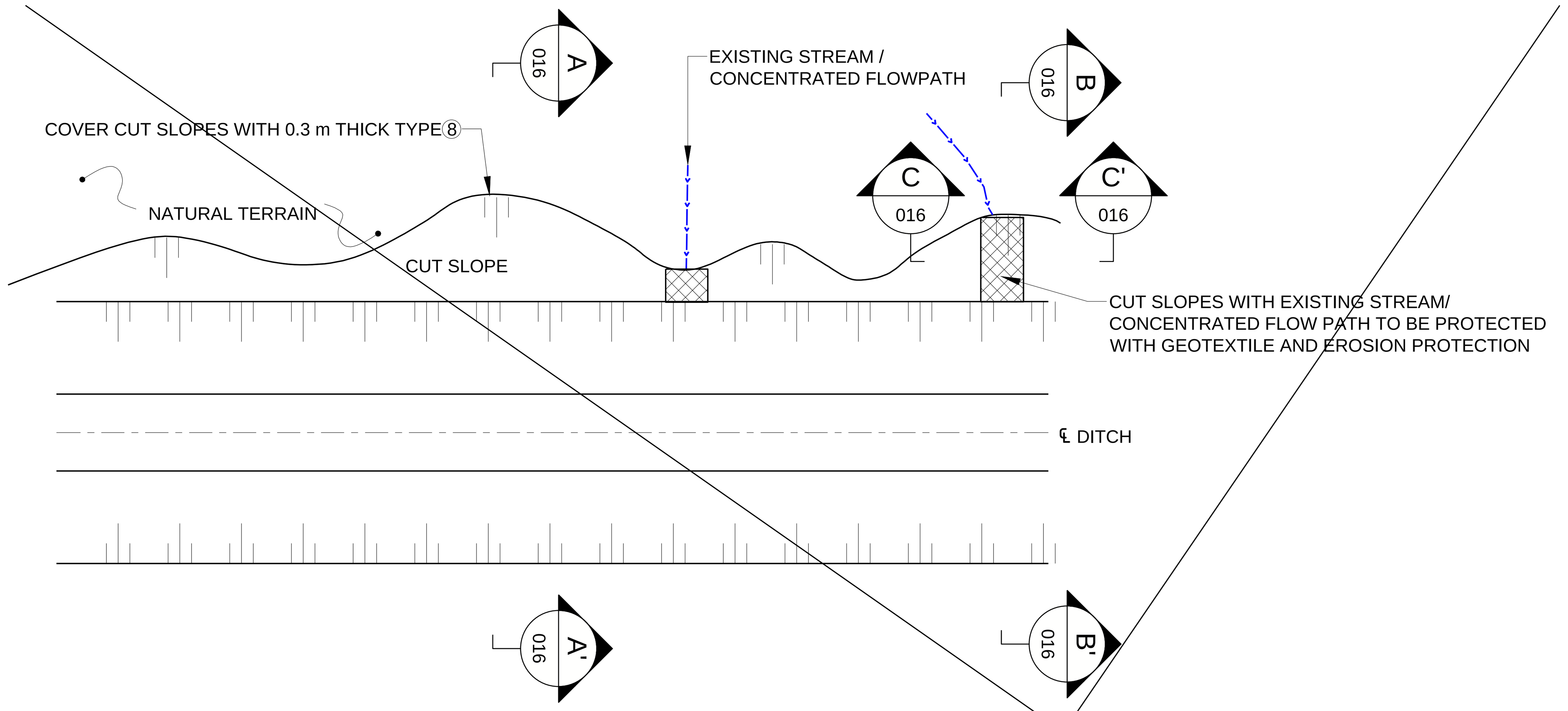
PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

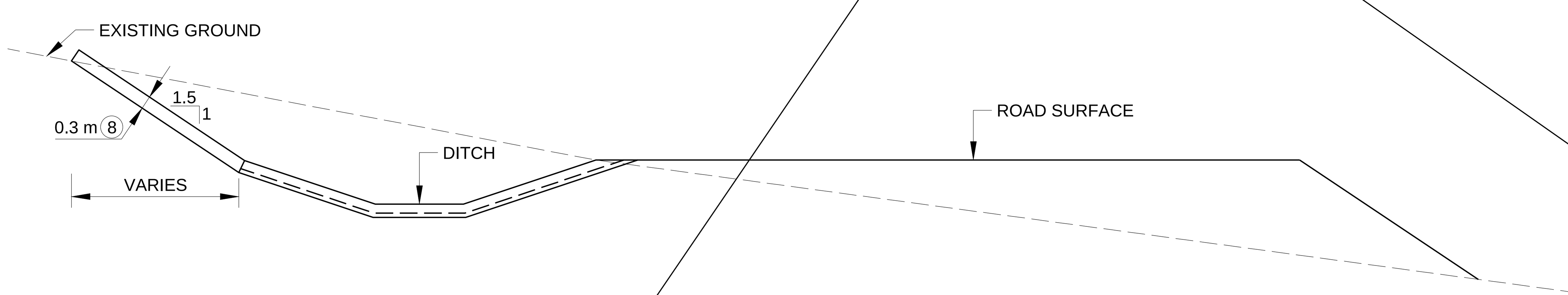
TITLE
DITCHES AND SEDIMENT TRAPS TYPICAL DETAILS

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	15 of 17	015

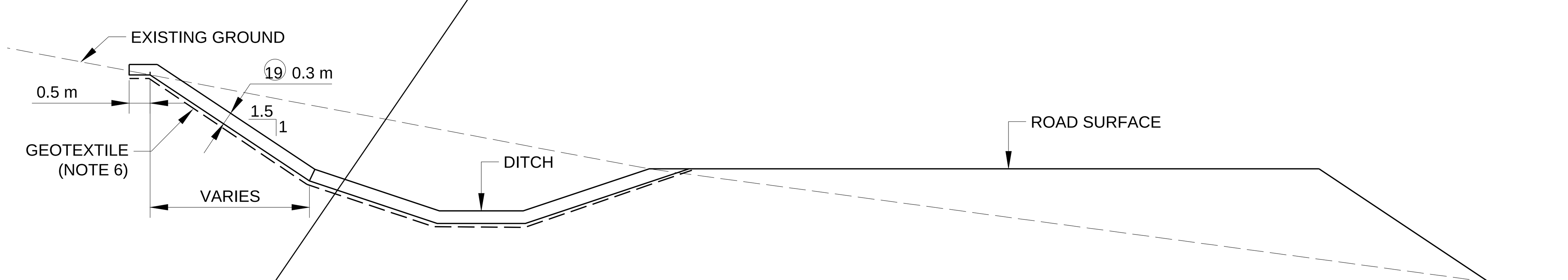


TYPICAL CUT SLOPE EROSION PROTECTION
SCALE 1:150

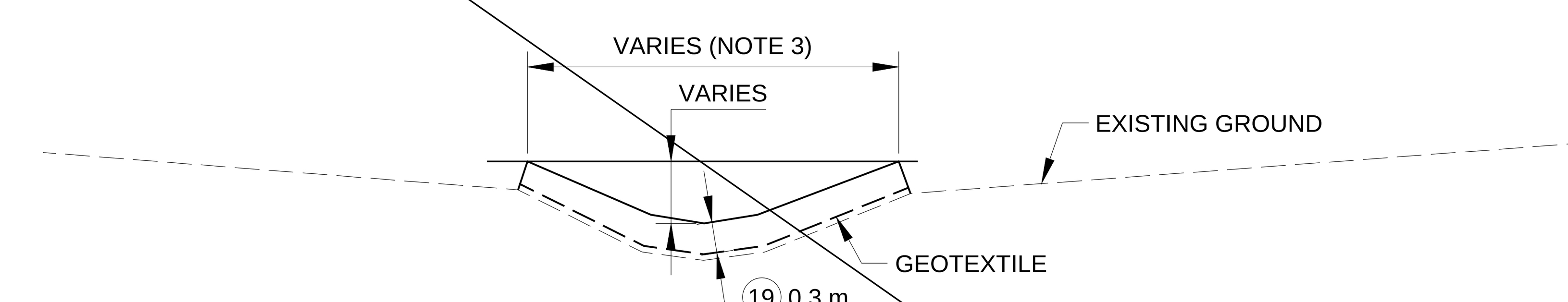
NOTE 1



SCALE 1:100 A 016 PROFILE THROUGH CUT SLOPE



SCALE 1:100 B 016 PROFILE THROUGH CUT SLOPE WITH STREAM OR CONCENTRATED FLOW PATH



SCALE 1:50 m C 016 CROSS-SECTION THROUGH STREAM OR CONCENTRATED FLOW PATH

0 5 10
1:100 METRES

0 5 10
1:150 METRES

NOTES

1. NO CUT SLOPE EROSION PROTECTION WAS PLACED DURING THIS CONSTRUCTION PHASE DUE TO THE ENCOUNTERED FIELD CONDITIONS (I.E. SLOPES COVERED IN SNOW AND ICE).
2. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
3. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
4. THE GEOTECHNICAL ENGINEER'S SEAL ON THIS DRAWING VERIFIES THAT THE AS-BUILT INFORMATION PROVIDED BY OTHERS AND REVIEWED, BUT NOT INSPECTED BY THE GEOTECHNICAL ENGINEER, HAS NO MATERIAL EFFECT ON THE DESIGN OF THE COMPLETED WORK.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
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PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
CUT SLOPES EROSION PROTECTION DETAILS

PROJECT NO.	PHASE	REV.		DRAWING
1649295	7000	2	16 of 17	016

DITCH 1 SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
D101	563159.30	7912821.98	259.50
D102	563204.45	7912843.25	260.56
D103	563236.73	7912880.71	262.22
D104	563261.75	7912923.98	263.59
D105	563278.26	7912970.38	266.03
D106	563283.04	7913020.15	270.44
D107	563282.87	7913070.04	275.18
D108	563271.78	7913118.70	279.12
D109	563263.65	7913167.84	282.95
D110	563254.28	7913215.67	286.43
D111	563272.85	7913260.92	291.65
D112	563298.12	7913303.84	297.73
D113	563329.77	7913341.21	300.79
D114	563367.19	7913374.26	304.60
D115	563402.66	7913409.42	310.61
D116	563439.07	7913443.57	317.07
D117	563480.67	7913471.16	321.48
D118	563524.68	7913494.80	324.79
D119	563570.17	7913521.20	329.94

DITCH 2 SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
D201	563597.31	7913553.99	332.58
D202	563625.10	7913595.55	338.89
D203	563652.41	7913637.40	345.24
D204	563671.17	7913683.66	352.46
D205	563708.48	7913715.37	357.48
D206	563721.21	7913732.91	360.25

DITCH 3 SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
D301	563819.64	7913761.47	369.56
D302	563865.23	7913781.56	375.04
D303	563913.77	7913793.26	378.62
D304	563962.17	7913805.61	383.41
D305	564007.80	7913824.22	389.10
D306	564050.60	7913849.90	394.62
D307	564062.68	7913858.07	396.25

DITCH 4 SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
D401	564098.38	7913890.78	399.55
D402	564121.54	7913910.21	403.32
D403	564144.44	7913933.35	407.22
D404	564165.26	7913978.58	411.32
D405	564171.78	7914027.56	416.69
D406	564176.17	7914077.27	422.27
D407	564194.10	7914123.46	426.09
D408	564216.02	7914168.25	427.87
D409	564236.84	7914213.63	430.18
D410	564245.75	7914238.45	432.26

DITCH 5 SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
D501	564273.70	7914339.24	439.45
D502	564282.88	7914387.91	443.93
D503	564291.43	7914437.06	448.24
D504	564303.85	7914485.48	452.95
D505	564308.80	7914535.13	457.53
D506	564308.93	7914585.13	462.79
D507	564304.29	7914634.47	467.86
D508	564301.94	7914683.17	472.50
D509	564301.41	7914732.89	477.09
D510	564302.42	7914782.51	482.29
D511	564306.87	7914831.97	487.71
D512	564299.01	7914880.97	494.09
D513	564283.68	7914928.20	499.55
D514	564270.02	7914973.57	503.48

DITCH 6 SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
D601	564256.79	7915025.35	505.64
D602	564258.21	7915037.44	507.18
D603	564261.57	7915057.86	508.48
D604	564259.09	7915086.58	511.08
D605	564250.66	7915135.85	515.59
D606	564239.68	7915184.63	521.02
D607	564228.43	7915233.25	526.72
D608	564197.28	7915271.06	531.02
D609	564169.99	7915311.41	535.53
D610	564146.96	7915355.79	540.35
D611	564135.84	7915403.81	543.98
D612	564123.99	7915452.19	547.01
D613	564118.39	7915500.76	551.36
D614	564107.24	7915549.46	555.47
D615	564078.23	7915589.10	559.42
D616	564047.05	7915617.12	563.98

DITCH 7 SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
D701	563869.69	7915455.23	587.81
D702	563842.62	7915413.31	592.77
D703	563811.22	7915375.05	597.62
D704	563793.99	7915328.41	600.67
D705	563773.77	7915282.79	602.65
D706	563751.19	7915239.08	604.27
D707	563718.98	7915201.12	606.23
D708	563684.90	7915164.54	610.73
D709	563650.25	7915128.50	615.35
D710	563614.18	7915093.95	620.83
D711	563568.47	7915075.02	627.21
D712	563552.39	7915073.34	628.87

NOTES

1. DITCH LAYOUT WAS ADJUSTED TO MATCH FIELD CONDITIONS AS SHOWN ON DWGS. 003 TO 013.
2. REFER TO DWG. 002 FOR ADDITIONAL NOTES.
3. AS-BUILT SURVEY DATA WAS PROVIDED ON MAY 30, 2016 BY NUNA LOGISTICS AND IS SHOWN AS PROVIDED UNLESS OTHERWISE INDICATED.
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PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
DITCH SETOUT POINTS

PROJECT NO.	PHASE	REV.	17 of 17	DRAWING
1649295	7000	2		017

APPENDIX B

As-Built Survey Files (Raw format) Provided by Baffinland

APPENDIX C

Site Checklists and Photographs Provided by Baffinland

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Golder Associates

Baffinland Iron Mines Corporation

Construction Summary Report Addendum: Milne Port Stockpile Settling Ponds

(Addendum to H349000-2345-10-124-0001)

REGISTERED PROFESSIONAL ENGINEER
M. J. BUYKX
LICENSEE
27/9/16
NT/NU

2016-09-27	0	Approved for Use	M. Buykx	T. Bruce	J. Cleland	W. McPhee
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**	**Approved By**	**Approved By**
HATCH						**Client**

Table of Contents

1. Introduction

This addendum to the Milne Port Stockpile Settling Ponds Construction Summary Report addresses the ditches, swales and road crossing around the perimeter of the Milne Port stockpile pad. This infrastructure is designed to collect runoff water from the stockpile pad and divert it to the two settling ponds. Construction of this infrastructure was not completed at the time of submission of the original Construction Summary Report, hence the requirement for this addendum.

2. Construction Activity Summary

The construction activities on the Milne Port stockpile settling pond drainage ditches started in May 2016 and were completed in June 2016.

The following summarizes the construction activities:

- Excavate ditch/swale.
- Construct berm.
- Place culverts.
- Backfill culverts.

3. Photographic Records

Figure 1: View looking South West showing Stockpile, Stockpile Pad, Drainage Ditch and Berm

Figure 2: View looking North East showing Culvert being Placed

Figure 3: View looking North East with Swale, Berm and Back Filled Culvert

Figure 4: View looking East with Swale, Berm and Culvert

Figure 5: View looking North East with Swale being Excavated

Figure 6: View looking North West with Swale, Berm and Drill Rig in Background

Figure 7: Excavator Bucket Ripping Pre Drilled Permafrost

Figure 8: View showing Ground Thaw Unit being Prepared for Use

Figure 9: View looking North in to West Runoff Pond with Culvert Placed

Figure 10: View looking North showing Drainage Ditch Diversion around Frozen Ore/Snow Stockpile

4. As Built Drawings

The as-built drawings incorporate survey data and field sketches provided by Baffinland.

A list of As Built drawings is provided in Table 4-1 and copies are attached in Appendix A.

Table 4-1: Milne Port Stockpile Runoff Drainage 'As-Built' Drawing List

Drawing Number	Title	Revision
H349000-2133-10-035-0001	Milne Port Ore Stockpiles No. 1 & 2 Earthworks & Drainage - Plan	3
H349000-2133-10-035-0002	Milne Port Ore Stockpiles No. 3 & 4 Earthworks & Drainage - Plan	3

5. Field Decisions

The following section describes field decisions made during construction:

a) Frozen ground made excavation of the ditches to the design depth difficult in areas where the trench is deeper. The Baffinland construction team used the following methods to excavate frozen ground:

- Excavate to frozen ground, then wait a day and re–excavate, giving the ground time to thaw between excavations.
- Rip the frozen ground prior to excavation.

- Drill a pattern of tightly spaced holes prior to excavation. Refer to Figure 6 and Figure 7.
- Use ground thaw units. Refer to Figure 8.

b) When water started flowing through the new ditch in to the West drainage pond, erosion of the pond inlet embankment was observed. A culvert was installed to prevent further erosion. Refer to Figure 9.

c) In limited locations on the East and West side of the pad, stockpiles of snow mixed with ore were positioned over the design ditch alignment. These snow/ore stockpiles resulted in the ground being frozen right to the surface. Rather than excavate the frozen ground, a field decision was taken to divert the ditch around the stockpiles. Refer to Figure 10.

d) Puddles of water on the stockpile pad were pumped direct to the runoff pond, so that they did not drain in to the ditch during construction.

e) On the East side of the stockpile pad, the designed ditch alignment was diverted to the West to maintain the existing service road alignment.

f) An additional culvert was added on the North of the stockpile pad, to enable continued use of the existing site constructed access road on to the ore dock.

g) The location of the South access road on to the ore pad was moved West, to enable continued use of the existing pad access road.

6. Earthworks Data

The survey data collected by Baffinland has been included in Appendix B.

7. Unanticipated Observations

The following unanticipated observations occurred during construction of the drainage ditch:

a) Challenges were experienced excavating the frozen ground down to the required elevation at the bottom of the ditch.

b) Erosion of the pond inlet embankment was initially experienced. A culvert was placed to prevent further erosion.

c) Location of site constructed access roads did not align with the design locations. One culvert crossing was added and one culvert crossing was relocated to accommodate this change.

Appendix A

As-Built Drawings

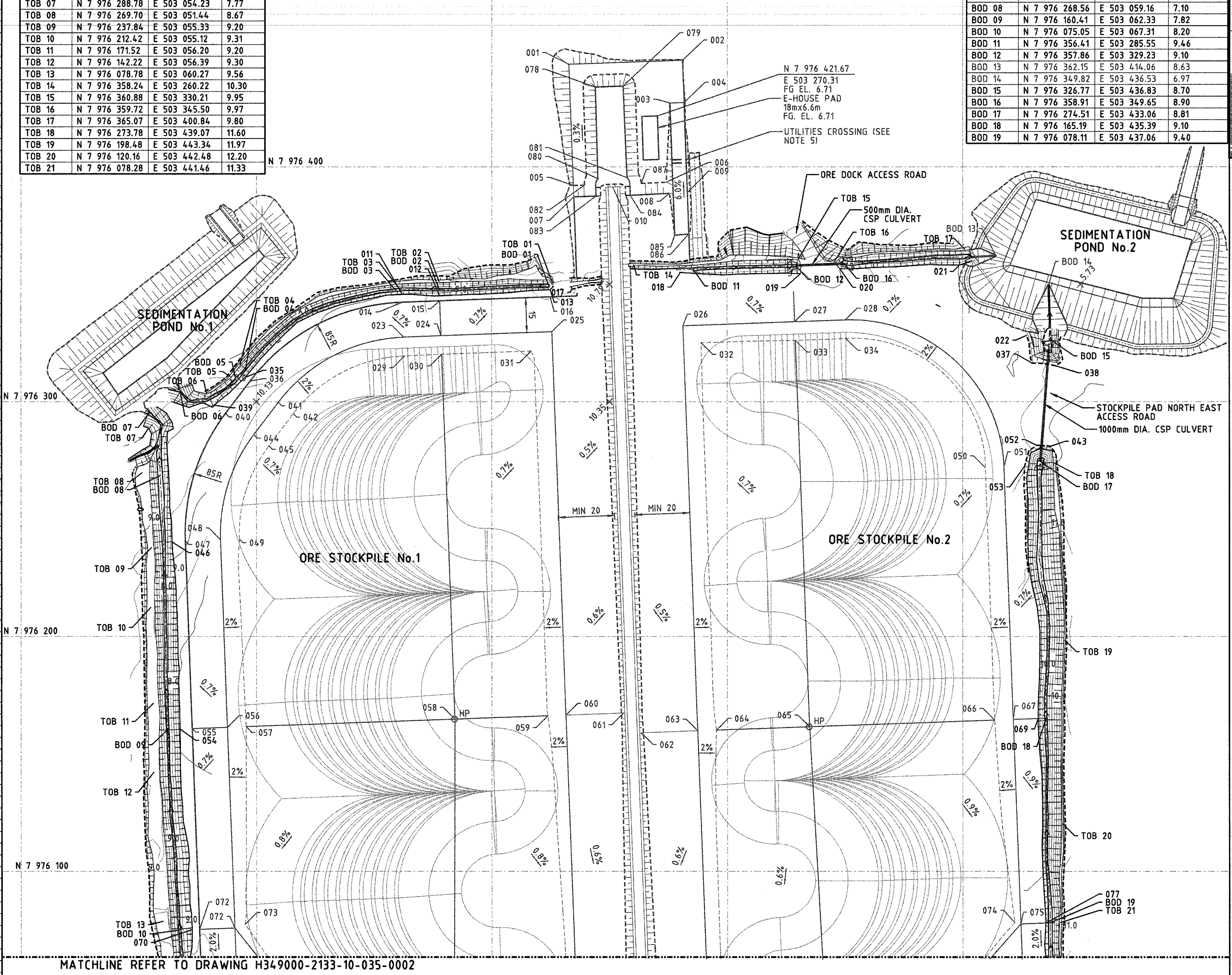
DWG. NO. H349000-2133-10-035-0001

POINTS FOR ORE STOCKPILE PAD

POINT No.	NORTHING	EASTING	EL.
001	N 7 976 443.58	E 503 232.75	6.50
002	N 7 976 445.32	E 503 280.96	6.50
003	N 7 976 427.12	E 503 275.61	6.59
004	N 7 976 427.34	E 503 281.61	6.59
005	N 7 976 392.05	E 503 234.61	6.76
006	N 7 976 393.48	E 503 274.06	6.76
007	N 7 976 387.23	E 503 234.78	9.97
008	N 7 976 388.70	E 503 275.40	9.97
009	N 7 976 388.96	E 503 283.00	8.89
010	N 7 976 391.44	E 503 251.39	10.75
011	N 7 976 345.75	E 503 161.96	9.08
012	N 7 976 345.20	E 503 177.87	9.60
013	N 7 976 347.79	E 503 224.80	9.33
014	N 7 976 342.49	E 503 162.09	10.25
015	N 7 976 343.06	E 503 177.88	10.32
016	N 7 976 345.17	E 503 236.30	10.03
017	N 7 976 347.96	E 503 233.92	9.50
018	N 7 976 355.09	E 503 280.05	9.90
019	N 7 976 354.53	E 503 331.06	9.79
020	N 7 976 356.61	E 503 347.90	9.95
021	N 7 976 358.22	E 503 398.59	10.00
022	N 7 976 328.24	E 503 427.18	10.10
023	N 7 976 327.50	E 503 162.63	10.32
024	N 7 976 328.15	E 503 178.42	10.40
025	N 7 976 329.85	E 503 225.58	10.16
026	N 7 976 332.36	E 503 281.19	10.09
027	N 7 976 334.07	E 503 328.7	10.33
028	N 7 976 334.85	E 503 350.24	10.22
029	N 7 976 319.51	E 503 162.97	10.14
030	N 7 976 320.22	E 503 178.71	10.24
031	N 7 976 321.59	E 503 216.77	10.05
032	N 7 976 325.14	E 503 288.95	9.98
033	N 7 976 326.15	E 503 328.98	10.16
034	N 7 976 326.92	E 503 350.48	10.06
035	N 7 976 310.31	E 503 095.15	8.80
036	N 7 976 308.81	E 503 097.35	10.07
037	N 7 976 316.45	E 503 429.53	10.4
038	N 7 976 315.33	E 503 439.37	10.6
039	N 7 976 298.46	E 503 082.21	8.02
040	N 7 976 295.03	E 503 086.93	10.09
041	N 7 976 299.77	E 503 109.32	10.18
042	N 7 976 294.92	E 503 115.68	10.02
043	N 7 976 280.98	E 503 437.26	10.9
044	N 7 976 285.99	E 503 098.90	10.19
045	N 7 976 281.20	E 503 105.30	10.03
046	N 7 976 240.27	E 503 064.18	8.71
047	N 7 976 240.70	E 503 069.79	10.26
048	N 7 976 241.24	E 503 084.78	10.33
049	N 7 976 241.45	E 503 092.77	10.17
050	N 7 976 271.90	E 503 409.61	10.06
051	N 7 976 272.23	E 503 417.54	10.22
052	N 7 976 281.34	E 503 431.50	10.68
053	N 7 976 272.60	E 503 426.34	10.49
054	N 7 976 160.59	E 503 067.48	10.20
055	N 7 976 160.78	E 503 072.67	10.66
056	N 7 976 161.32	E 503 087.66	10.73
057	N 7 976 161.61	E 503 095.55	10.57
058	N 7 976 164.81	E 503 184.31	11.01
059	N 7 976 166.24	E 503 223.78	10.82
060	N 7 976 166.52	E 503 231.48	10.98
061	N 7 976 167.46	E 503 255.91	10.88
062	N 7 976 158.99	E 503 263.43	10.86
063	N 7 976 159.85	E 503 287.41	10.95
064	N 7 976 160.14	E 503 295.34	10.79
065	N 7 976 161.57	E 503 334.92	10.99
066	N 7 976 164.40	E 503 413.57	10.59
067	N 7 976 164.69	E 503 421.42	10.76
069	N 7 976 165.07	E 503 432.04	10.21
070	N 7 976 075.22	E 503 072.60	9.70
071	N 7 976 075.33	E 503 075.75	10.23
072	N 7 976 075.88	E 503 090.74	10.23
073	N 7 976 077.51	E 503 095.14	10.14
074	N 7 976 078.44	E 503 422.34	10.03
075	N 7 976 077.66	E 503 424.55	10.08
077	N 7 976 078.03	E 503 435.17	9.90
078	N 7 976 433.91	E 503 243.95	9.97
079	N 7 976 434.34	E 503 255.74	9.97
080	N 7 976 394.97	E 503 245.07	9.97
081	N 7 976 395.41	E 503 257.44	9.97
082	N 7 976 392.21	E 503 239.39	6.71
083	N 7 976 387.54	E 503 244.22	9.97
084	N 7 976 387.87	E 503 258.82	9.97
085	N 7 976 370.97	E 503 277.65	9.96
086	N 7 976 371.51	E 503 283.63	9.94
087	N 7 976 392.93	E 503 263.47	6.71

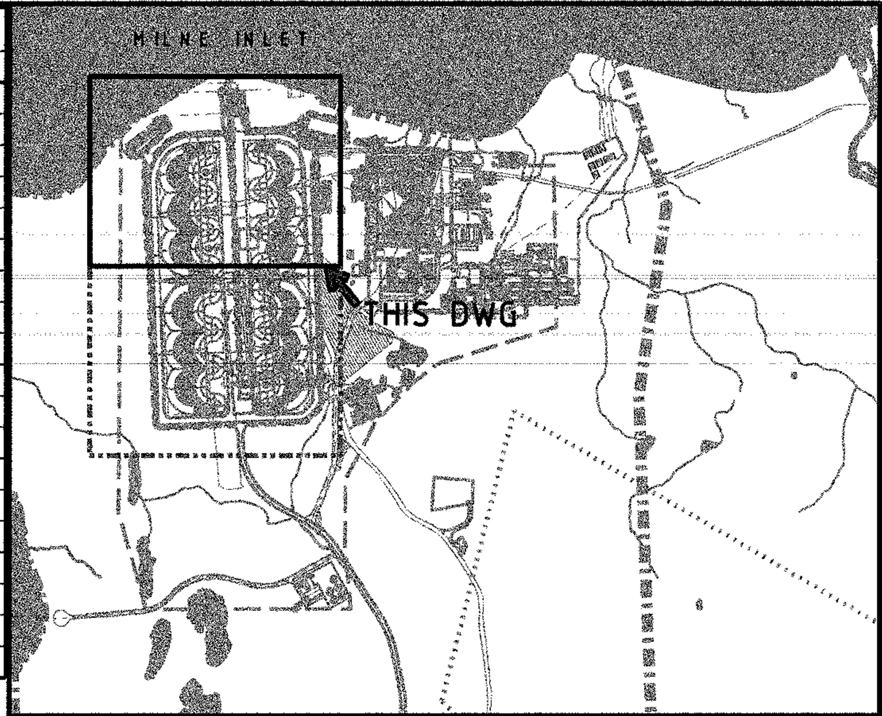
POINTS FOR DRAINAGE BERM

POINT No.	NORTHING	EASTING	EL.
TOB 01	N 7 976 350.70	E 503 225.79	9.70
TOB 02	N 7 976 351.31	E 503 177.58	9.89
TOB 03	N 7 976 350.54	E 503 158.77	9.50
TOB 04	N 7 976 315.95	E 503 093.10	9.30
TOB 05	N 7 976 310.71	E 503 089.01	8.90
TOB 06	N 7 976 303.66	E 503 078.84	8.49
TOB 07	N 7 976 288.78	E 503 054.23	7.77
TOB 08	N 7 976 269.70	E 503 051.44	8.67
TOB 09	N 7 976 237.84	E 503 055.33	9.20
TOB 10	N 7 976 212.42	E 503 055.12	9.31
TOB 11	N 7 976 171.52	E 503 056.20	9.20
TOB 12	N 7 976 142.22	E 503 056.39	9.30
TOB 13	N 7 976 078.78	E 503 060.27	9.56
TOB 14	N 7 976 358.24	E 503 260.22	10.30
TOB 15	N 7 976 360.88	E 503 330.21	9.95
TOB 16	N 7 976 359.72	E 503 345.50	9.97
TOB 17	N 7 976 365.07	E 503 400.84	9.80
TOB 18	N 7 976 273.78	E 503 439.07	11.60
TOB 19	N 7 976 198.48	E 503 443.34	11.97
TOB 20	N 7 976 120.16	E 503 442.48	12.20
TOB 21	N 7 976 078.28	E 503 441.46	11.33



POINTS FOR DRAINAGE DITCH

POINT No.	NORTHING	EASTING	EL.
BOD 01	N 7 976 349.44	E 503 224.15	8.80
BOD 02	N 7 976 347.80	E 503 177.78	8.52
BOD 03	N 7 976 347.60	E 503 159.07	8.40
BOD 04	N 7 976 313.71	E 503 095.32	8.10
BOD 05	N 7 976 309.50	E 503 091.27	8.00
BOD 06	N 7 976 304.36	E 503 067.66	5.27
BOD 07	N 7 976 295.09	E 503 054.39	5.26
BOD 08	N 7 976 268.56	E 503 059.16	7.10
BOD 09	N 7 976 160.41	E 503 062.33	7.82
BOD 10	N 7 976 075.05	E 503 067.31	8.20
BOD 11	N 7 976 356.41	E 503 285.55	9.46
BOD 12	N 7 976 357.86	E 503 329.23	9.10
BOD 13	N 7 976 362.15	E 503 414.06	8.63
BOD 14	N 7 976 349.82	E 503 436.53	6.97
BOD 15	N 7 976 326.77	E 503 436.83	8.70
BOD 16	N 7 976 358.91	E 503 349.65	8.90
BOD 17	N 7 976 274.51	E 503 433.06	8.81
BOD 18	N 7 976 165.19	E 503 435.39	9.10
BOD 19	N 7 976 078.11	E 503 437.06	9.40



KEY PLAN

LEGEND

9.0	AS BUILT CONTOURS
	EXISTING WATERBODY
	BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
	PROJECT DEVELOPMENT AREA (PDA)
	FILL SLOPE
	CUT SLOPE
	TOE OF SLOPE
	SLOPE BREAKLINE
%	GRADING SLOPE
	CENTERLINE OF DITCH
	CULVERT
11.15	FG EL. AT 50m x 50m GRID
HP	HIGH POINT
01	AS BUILT POINT NUMBER
01	SETOUT POINT NUMBER (NONE AS BUILT)
CSP	CORRUGATED STEEL PIPE
	UTILITIES CROSSING (SEE NOTE 7)
TOB	TOP OF BERM
BOD	BOTTOM OF DITCH

NOTES:

1. AS BUILT SURVEY DATA PROVIDED BY BAFFINLAND.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 0.5m.
4. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METRES UNLESS NOTED OTHERWISE.
5. FOR SEDIMENTATION PONDS PLAN AND DETAIL REFER TO DRAWING H349000-2345-10- 035-0001.
6. UTILITIES ARE CROSSING ROAD SURFACES UNDERNEATH OF RAMP TO REACH ON TOP OF FINISHED SURFACE ELEVATION (6.7). FOR TYPICAL DETAILS FOR ROAD CROSSING SEE DETAIL 18, DRAWING H349000-1000-10-041-0009

0 10 20 30 40 50
SCALE IN METRES

3 AS BUILT

REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE
H349000-2345-10-035-0001	MILNE PORT-ORE STOCKPILE SEDIMENTATION PONDS-EARTHWORKS & DRAINAGE
H349000-2000-00-014-0001	MILNE PORT-SITE LAYOUT

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REVISIONS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
3	AS BUILT INFOMATION ADDED	AW	MB	MB	2016-09-27
2	LOWERED NORTH SECTION OF PAD BY 0.3m	GJ	JG	JC	2014-08-07
1	EARTHWORKS BOUNDARY AND ELEVATIONS AT NORTH CHANGED DUE TO CONVEYOR MODIFICATIONS	GJ	KF	SH	2013-11-15

ISSUE AUTHORIZATION

REV.	ISSUE FOR	AUTH.	BY	DATE
3	AS BUILT	AW	MB	2016-09-27
2	CONSTRUCTION	JG	GJ	2014-08-07
1	CONSTRUCTION	SH	GJ	2013-11-15
0	CONSTRUCTION	SH	MM	2013-08-30

HATCH

DESIGNED BY K FALLAHI DATE 2013-08-23	DRAWN BY M. MCDOUGALD DATE 2013-08-23
CHECKED BY A. MOHEBKHANI DATE 2013-08-29	DISCIP. ENGR. S. HASSAN DATE 2013-08-29
PROJ. DES. COORD. T. THERTELL DATE 2013-08-29	PROJ. ENGR. S. PERRY DATE 2013-08-29
PROJ. MGR. J. CLELAND DATE 2013-08-29	

Baffinland

MARY RIVER PROJECT

MILNE PORT ORE STOCKPILES NO. 1 & 2 EARTHWORKS & DRAINAGE – PLAN

SCALE 1:1000 OR AS NOTED | DWG. NO. H349000-2133-10-035-0001 | REV. 3

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

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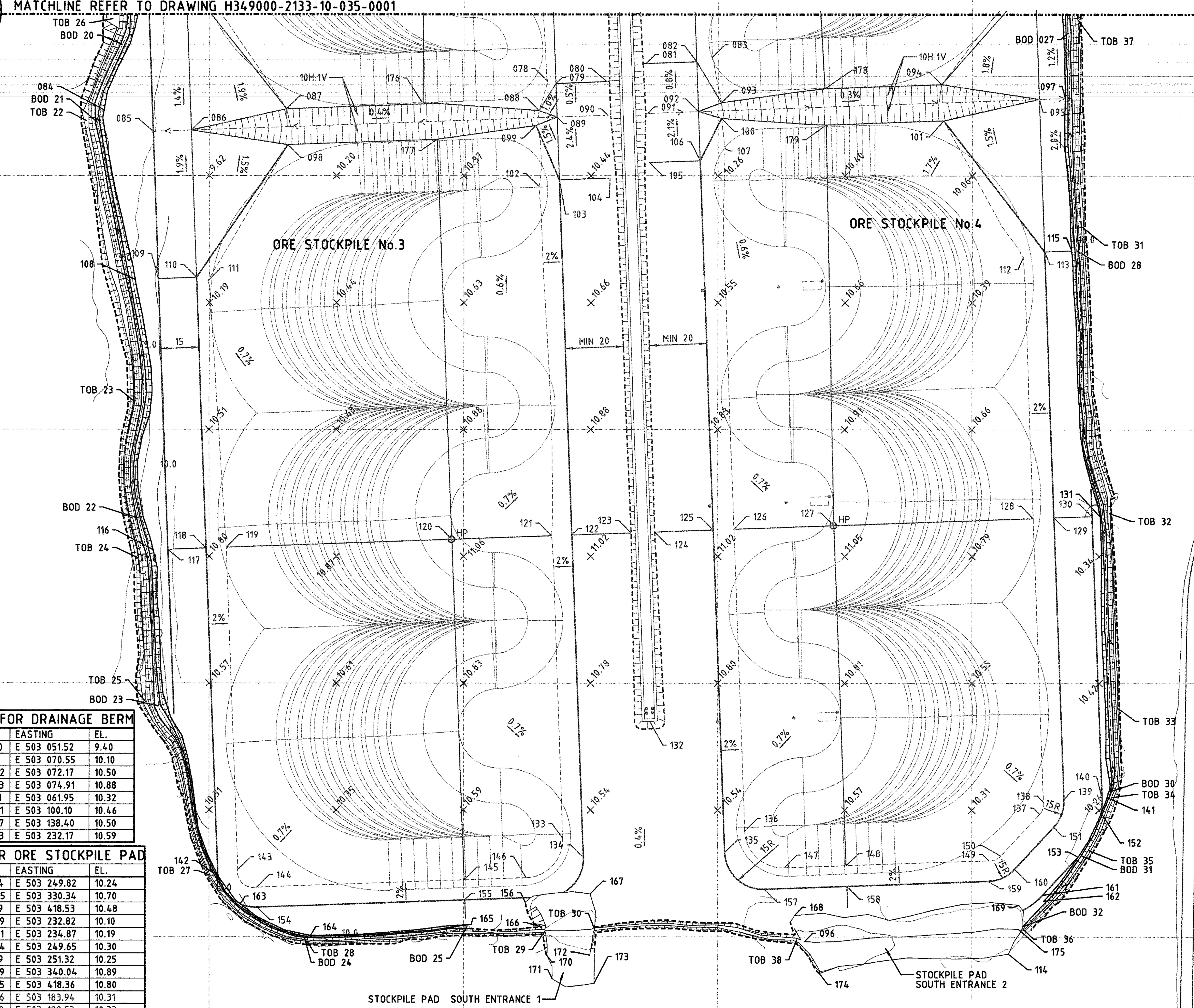
DWG. NO. H349000-2133-10-035-0002

MATCHLINE REFER TO DRAWING H349000-2133-10-035-0001



SETOUT POINTS FOR ORE STOCKPILE PAD

POINT No.	NORTHING	EASTING	EL.
078	N 7 976 037.17	E 503 232.90	10.16
079	N 7 976 036.30	E 503 236.18	10.23
080	N 7 976 037.02	E 503 256.17	10.23
081	N 7 976 044.13	E 503 271.58	10.37
082	N 7 976 044.85	E 503 291.57	10.37
083	N 7 976 046.68	E 503 297.69	10.24
084	**N 7 976 025.76**	**E 503 058.52**	**9.01**
085	N 7 976 017.35	E 503 077.85	9.07
086	N 7 976 017.89	E 503 092.84	9.15
087	N 7 976 026.32	E 503 130.29	10.04
088	N 7 976 025.67	E 503 229.56	10.11
089	N 7 976 023.09	E 503 236.66	9.86
090	N 7 976 023.81	E 503 256.64	9.96
091	N 7 976 024.57	E 503 272.29	9.98
092	N 7 976 025.30	E 503 292.27	9.88
093	N 7 976 028.74	E 503 301.33	10.14
094	N 7 976 035.91	E 503 387.89	10.11
095	N 7 976 030.14	E 503 426.28	9.21
096	**N 7 975 698.20**	**E 503 334.31**	**11.20**
097	**N 7 976 030.52**	**E 503 436.52**	**9.82**
098	N 7 976 012.18	E 503 130.79	10.04
099	N 7 976 019.79	E 503 228.36	10.12
100	N 7 976 022.58	E 503 301.29	10.13
101	N 7 976 021.68	E 503 388.71	10.10
102	N 7 975 995.84	E 503 229.48	10.31
103	N 7 975 998.37	E 503 237.55	10.46
104	N 7 975 999.09	E 503 257.54	10.46
105	N 7 976 005.19	E 503 272.99	10.36
106	N 7 976 005.91	E 503 292.98	10.36
107	N 7 976 010.70	E 503 302.71	10.13
108	**N 7 975 959.00**	**E 503 070.81**	**9.51**
109	N 7 975 959.38	E 503 079.94	10.23
110	N 7 975 959.92	E 503 094.93	10.23
111	N 7 975 958.61	E 503 099.43	10.14
112	N 7 975 967.87	E 503 420.05	10.17
113	N 7 975 970.11	E 503 428.43	10.33
114	**N 7 975 693.33**	**E 503 414.38**	**10.42**
115	**N 7 975 970.50**	**E 503 439.10**	**10.39**
116	**N 7 975 852.46**	**E 503 077.95**	**9.64**
117	N 7 975 852.67	E 503 083.79	10.76
118	N 7 975 853.22	E 503 098.78	10.84
119	N 7 975 853.50	E 503 106.70	10.68
120	N 7 975 856.71	E 503 195.43	11.12
121	N 7 975 858.12	E 503 234.68	10.93
122	N 7 975 858.41	E 503 242.61	11.09
123	N 7 975 859.25	E 503 265.94	10.99
124	N 7 975 859.59	E 503 275.19	10.98
125	N 7 975 860.42	E 503 298.23	11.10
126	N 7 975 860.72	E 503 306.38	10.93
127	N 7 975 862.14	E 503 345.72	11.13
128	N 7 975 864.96	E 503 424.06	10.74
129	N 7 975 865.26	E 503 432.22	10.90
130	N 7 975 865.80	E 503 447.21	10.83
131	**N 7 975 865.80**	**E 503 450.35**	**10.10**
132	N 7 975 784.97	E 503 273.26	11.65
133	N 7 975 738.81	E 503 239.09	10.33
134	N 7 975 731.22	E 503 247.19	10.45
135	N 7 975 733.23	E 503 302.82	10.47
136	N 7 975 741.69	E 503 310.68	10.34
137	N 7 975 748.40	E 503 426.64	10.17
138	N 7 975 753.12	E 503 428.21	10.18
139	N 7 975 754.09	E 503 436.23	10.35
140	N 7 975 754.63	E 503 451.22	10.27
141	**N 7 975 755.08**	**E 503 453.18**	**10.50**
142	**N 7 975 723.64**	**E 503 103.65**	**9.86**
143	N 7 975 726.40	E 503 111.28	10.04
144	N 7 975 719.50	E 503 118.70	10.04
145	N 7 975 722.45	E 503 200.28	10.45
146	N 7 975 723.28	E 503 224.62	10.33
147	N 7 975 727.24	E 503 326.21	10.34
148	N 7 975 728.12	E 503 350.56	10.47
149	N 7 975 730.03	E 503 406.72	10.18
150	N 7 975 731.93	E 503 411.32	10.17
151	N 7 975 743.33	E 503 432.22	10.32
152	**N 7 975 748.97**	**E 503 450.89**	**10.60**
153	**N 7 975 731.52**	**E 503 441.73**	**10.60**
154	N 7 975 711.58	E 503 118.90	10.20
155	N 7 975 714.52	E 503 200.56	10.61
156	**N 7 975 713.57**	**E 503 224.28**	**9.99**
157	N 7 975 718.78	E 503 318.35	10.47
158	N 7 975 719.95	E 503 350.85	10.63
159	N 7 975 721.96	E 503 406.34	10.35
160	N 7 975 726.73	E 503 416.78	10.32
161	N 7 975 716.51	E 503 427.76	10.21
162	**N 7 975 714.17**	**E 503 428.27**	**10.40**
163	**N 7 975 712.88**	**E 503 112.23**	**9.93**
164	**N 7 975 700.42**	**E 503 139.89**	**10.00**
165	**N 7 975 704.84**	**E 503 203.12**	**10.20**
166	**N 7 975 703.79**	**E 503 230.79**	**10.19**

SETOUT POINTS FOR DRAINAGE BERM

POINT No.	NORTHING	EASTING	EL.
TOB 22	N 7 976 021.60	E 503 051.52	9.40
TOB 23	N 7 975 911.10	E 503 070.55	10.10
TOB 24	N 7 975 849.22	E 503 072.17	10.50
TOB 25	N 7 975 792.63	E 503 074.91	10.88
TOB 26	N 7 976 061.71	E 503 061.95	10.32
TOB 27	N 7 975 724.21	E 503 100.10	10.46
TOB 28	N 7 975 698.37	E 503 138.40	10.50
TOB 29	N 7 975 702.33	E 503 232.17	10.59

SETOUT POINTS FOR ORE STOCKPILE PAD

POINT No.	NORTHING	EASTING	EL.
167	**N 7 975 716.94**	**E 503 249.82**	**10.24**
168	**N 7 975 708.45**	**E 503 330.34**	**10.70**
169	**N 7 975 712.59**	**E 503 418.53**	**10.48**
170	**N 7 975 692.69**	**E 503 232.82**	**10.10**
171	**N 7 975 683.41**	**E 503 234.87**	**10.19**
172	**N 7 975 692.74**	**E 503 249.65**	**10.30**
173	**N 7 975 681.59**	**E 503 251.32**	**10.25**
174	**N 7 975 685.59**	**E 503 340.04**	**10.89**
175	**N 7 975 703.05**	**E 503 418.36**	**10.80**
176	N 7 976 028.26	E 503 183.94	10.31
177	N 7 976 014.32	E 503 189.53	10.33
178	N 7 976 034.25	E 503 341.98	10.34
179	N 7 976 020.01	E 503 342.50	10.34

SETOUT POINTS FOR BOTTOM OF DITCH

POINT No.	NORTHING	EASTING	EL.
BOD 20	N 7 976 051.57	E 503 065.67	8.30
BOD 21	N 7 976 020.93	E 503 055.86	8.40
BOD 22	N 7 975 864.98	E 503 072.00	8.80
BOD 23	N 7 975 790.91	E 503 079.79	9.17
BOD 24	N 7 975 699.91	E 503 137.42	9.95
BOD 25	N 7 975 703.99	E 503 201.35	10.20

SETOUT POINTS FOR BOTTOM OF DITCH

POINT No.	NORTHING	EASTING	EL.
BOD 27	N 7 976 056.18	E 503 437.51	9.50
BOD 28	N 7 975 970.55	E 503 441.11	9.73
BOD 29	N 7 975 900.59	E 503 444.39	9.90
BOD 30	N 7 975 757.48	E 503 454.64	10.40
BOD 31	N 7 975 732.12	E 503 443.03	10.52
BOD 32	N 7 975 704.30	E 503 420.25	10.64

SETOUT POINTS FOR DRAINAGE BERM

POINT No.	NORTHING	EASTING	EL.
TOB 30	N 7 975 702.93	E 503 251.66	10.80
TOB 31	N 7 975 979.85	E 503 443.26	10.80
TOB 32	N 7 975 867.04	E 503 453.99	10.90
TOB 33	N 7 975 790.49	E 503 457.05	10.79
TOB 34	N 7 975 755.12	E 503 455.42	10.90
TOB 35	N 7 975 734.09	E 503 446.17	11.00
TOB 36	N 7 975 703.01	E 503 420.23	11.19
TOB 37	N 7 976 061.19	E 503 441.65	11.00
TOB 38	N 7 975 698.80	E 503 331.08	11.30

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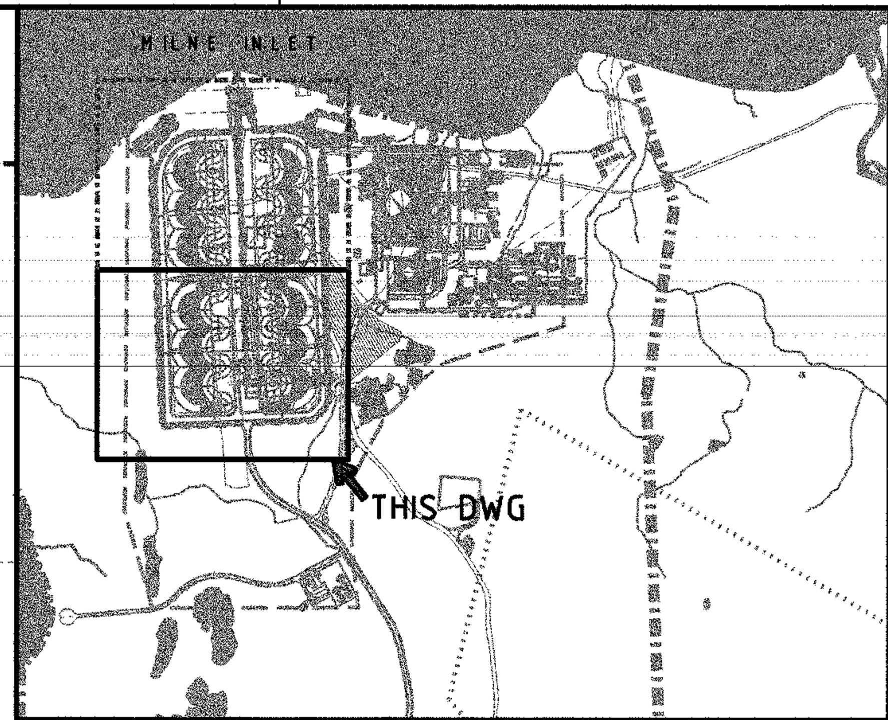

KEY PLAN

LEGEND

- AS BUILT CONTOUR (10.0)
- EXISTING WATERBODY
- BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
- PROJECT DEVELOPMENT AREA (PDA)
- FILL SLOPE
- CUT SLOPE
- TOE OF SLOPE
- SLOPE BREAKLINE
- % GRADING SLOPE
- CENTERLINE OF SWALE/DITCH
- FG EL. AT 50m x 50m GRID
- HP HIGH POINT
- 01 AS BUILT POINT NUMBER
- 01 SETOUT POINT NUMBER (NONE AS BUILT)
- UB UTILITY BERM
- TOB AS BUILT TOP OF BERM
- BOD AS BUILT BOTTOM OF DITCH

NOTES:

1. AS BUILT SURVEY DATA PROVIDED BY BAFFINLAND.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 0.5m.
4. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METRES UNLESS NOTED OTHERWISE.

3 AS BUILT

REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE
H349000-3000-10-012-0001	TOTE ROAD – PLAN AND PROFILE
H349000-2000-10-014-0001	MILNE PORT – SITE LAYOUT

REVISIONS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
3	AS BUILT INFORMATION ADDED	AW	MB	MB	2016-09-27
2	LOWERED NORTH SECTION OF PAD BY 0.3m	GJ	JG	JC	2014-08-07
1	EARTHWORKS BOUNDARY AND ELEVATIONS AT SOUTH CHANGED DUE TO CONVEYOR MODIFICATIONS	GJ	KF	SH	2013-11-15

ISSUE AUTHORIZATION

REV.	ISSUE FOR	AUTH.	BY	DATE
3	AS BUILT	AW	MB	2016-09-27
2	CONSTRUCTION	JG	GJ	2014-08-07
1	CONSTRUCTION	SH	GJ	2013-11-15
0	CONSTRUCTION	SH	MM	2013-08-30

HATCH

DESIGNED BY K. FALLAHI DATE 2013-08-23	DRAWN BY M. MCDOUGALD DATE 2013-08-23
CHECKED BY A. MOHEBKHANI DATE 2013-08-30	DISCIP. ENGR. S. HASSAN DATE 2013-08-30
PROJ. DES. COORD. T. THERTELL DATE 2013-08-30	PROJ. ENGR. S. PERRY DATE 2013-08-30
PROJ. MGR. J. CLELAND DATE 2013-08-30	

Baffinland

MARY RIVER PROJECT

MILNE PORT
ORE STOCKPILES NO. 3 & 4
EARTHWORKS & DRAINAGE – PLAN

SCALE 1:1000 OR AS NOTED | DWG. NO. H349000-2133-10-035-0002 | REV. 3

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

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Appendix B

Survey Data

Ditch_W

Point No.	Northing	Easting	Elevation	Location
2015P001A	7975424.455	503766.105	51.873	REBAR
402	7976297.812	503057.841	7.214	CREST
403	7976295.207	503061.809	7.826	CREST
404	7976291.026	503064.327	7.623	CREST
405	7976288.507	503064.660	7.540	CREST
406	7976287.224	503062.284	7.532	CREST
407	7976282.032	503061.979	8.009	CREST
408	7976275.722	503062.308	8.083	CREST
409	7976270.875	503062.704	8.156	CREST
410	7976265.500	503062.891	8.285	CREST
411	7976260.010	503063.199	8.341	CREST
412	7976254.477	503063.237	8.424	CREST
413	7976248.645	503063.949	8.598	CREST
414	7976242.485	503064.087	8.714	CREST
415	7976236.955	503064.330	8.861	CREST
416	7976231.147	503064.944	9.077	CREST
417	7976225.580	503065.502	9.251	CREST
418	7976220.311	503065.838	9.415	CREST
419	7976215.141	503065.922	9.467	CREST
420	7976208.998	503066.378	9.638	CREST
421	7976203.396	503066.475	9.843	CREST
422	7976197.585	503066.643	9.928	CREST
423	7976192.131	503066.677	9.990	CREST
424	7976186.192	503067.173	9.935	CREST
425	7976181.059	503066.977	10.177	CREST
426	7976175.858	503067.155	10.250	CREST
427	7976169.806	503067.364	10.326	CREST
428	7976163.891	503067.468	10.352	CREST
429	7976157.888	503067.488	10.176	CREST
430	7976151.661	503067.637	10.077	CREST
431	7976146.038	503067.623	9.973	CREST
432	7976139.982	503067.735	9.991	CREST
433	7976133.887	503067.990	9.889	CREST
434	7976128.059	503068.529	9.785	CREST
435	7976121.211	503068.837	9.770	CREST
436	7976116.271	503069.869	9.970	CREST
437	7976110.549	503070.970	10.000	CREST
438	7976105.570	503071.406	9.943	CREST
439	7976099.231	503070.923	9.726	CREST
440	7976093.935	503071.574	9.774	CREST
441	7976086.500	503071.628	9.587	CREST
442	7976082.271	503072.248	9.703	CREST
443	7976076.589	503072.578	9.786	CREST
444	7976073.027	503072.631	9.707	CREST
445	7976067.725	503072.507	9.654	CREST
446	7976060.809	503071.192	9.409	CREST
447	7976057.952	503070.520	9.234	CREST
448	7976057.992	503068.566	8.258	TOE
449	7976063.205	503068.884	8.242	TOE
450	7976067.702	503068.347	8.206	TOE
451	7976073.856	503067.912	8.191	TOE

Point No.	Northing	Easting	Elevation	Location
452	7976078.730	503067.315	8.156	TOE
453	7976084.847	503067.168	8.155	TOE
454	7976089.796	503066.671	8.126	TOE
455	7976095.320	503066.148	8.079	TOE
456	7976100.389	503066.168	8.031	TOE
457	7976106.069	503066.043	8.075	TOE
458	7976111.594	503065.520	8.063	TOE
459	7976117.991	503064.875	8.033	TOE
460	7976123.468	503064.252	8.054	TOE
461	7976129.792	503064.015	8.034	TOE
462	7976135.247	503063.869	7.983	TOE
463	7976139.807	503063.363	8.031	TOE
464	7976145.544	503063.127	8.016	TOE
465	7976151.045	503063.018	7.911	TOE
466	7976156.780	503062.950	7.922	TOE
467	7976162.569	503062.676	7.909	TOE
468	7976168.296	503062.483	7.852	TOE
469	7976173.682	503062.317	7.840	TOE
470	7976179.709	503062.312	7.818	TOE
471	7976184.753	503062.131	7.798	TOE
472	7976189.407	503062.148	7.753	TOE
473	7976194.357	503062.123	7.742	TOE
474	7976198.776	503061.988	7.672	TOE
475	7976204.104	503061.860	7.725	TOE
476	7976209.385	503061.704	7.645	TOE
477	7976214.313	503061.667	7.687	TOE
478	7976219.941	503061.572	7.676	TOE
479	7976225.395	503061.407	7.623	TOE
480	7976230.630	503061.347	7.550	TOE
481	7976235.849	503061.378	7.559	TOE
482	7976241.283	503061.318	7.570	TOE
483	7976246.561	503061.126	7.574	TOE
484	7976251.379	503060.783	7.571	TOE
485	7976256.383	503060.922	7.503	TOE
486	7976261.606	503060.660	7.287	TOE
487	7976266.915	503060.272	7.146	TOE
488	7976271.616	503059.951	7.015	TOE
489	7976274.865	503059.752	7.020	TOE
490	7976279.377	503059.464	6.884	TOE
491	7976283.961	503059.692	6.802	TOE
492	7976287.434	503059.517	6.451	TOE
493	7976290.427	503060.256	6.024	TOE
494	7976292.700	503057.575	5.601	TOE
495	7976294.968	503055.364	5.288	TOE
496	7976296.402	503054.082	5.198	TOE
497	7976297.324	503053.474	5.229	TOE
498	7976296.512	503053.054	5.144	SPOT
499	7976295.349	503052.326	5.223	TOE
500	7976294.074	503054.878	5.349	TOE
501	7976291.964	503057.787	5.696	TOE
502	7976289.686	503059.706	6.073	TOE
503	7976286.471	503058.783	6.560	TOE
504	7976283.923	503058.210	6.741	TOE

Point No.	Northing	Easting	Elevation	Location
505	7976283.047	503058.031	6.816	TOE
506	7976281.276	503058.552	6.910	TOE
507	7976278.152	503057.579	6.910	TOE
508	7976275.151	503057.744	7.027	TOE
509	7976270.405	503058.059	7.051	TOE
510	7976265.644	503058.333	7.201	TOE
511	7976261.743	503058.540	7.327	TOE
512	7976257.172	503058.624	7.457	TOE
513	7976252.803	503058.968	7.432	TOE
514	7976248.814	503059.312	7.513	TOE
515	7976243.288	503059.838	7.484	TOE
516	7976238.595	503060.056	7.494	TOE
517	7976234.131	503060.280	7.522	TOE
518	7976229.492	503060.432	7.564	TOE
519	7976225.125	503060.555	7.583	TOE
520	7976221.014	503060.376	7.605	TOE
521	7976216.473	503060.646	7.631	TOE
522	7976211.580	503060.702	7.643	TOE
523	7976207.414	503060.709	7.547	TOE
524	7976203.093	503060.725	7.613	TOE
525	7976198.744	503060.960	7.612	TOE
526	7976194.373	503061.116	7.607	TOE
527	7976190.219	503060.963	7.699	TOE
528	7976186.476	503060.854	7.705	TOE
529	7976182.380	503060.916	7.723	TOE
530	7976180.874	503061.024	7.677	TOE
531	7976176.267	503061.342	7.759	TOE
532	7976172.132	503061.390	7.775	TOE
533	7976167.525	503061.604	7.809	TOE
534	7976162.279	503061.718	7.849	TOE
535	7976157.697	503062.211	7.817	TOE
536	7976152.532	503062.086	7.889	TOE
537	7976147.856	503062.396	7.899	TOE
538	7976143.961	503062.400	7.953	TOE
539	7976140.084	503062.500	7.982	TOE
540	7976135.402	503062.739	7.935	TOE
541	7976131.051	503063.027	7.988	TOE
542	7976126.682	503063.184	7.979	TOE
543	7976124.588	503063.098	8.021	TOE
544	7976121.662	503063.376	8.040	TOE
545	7976117.321	503063.964	8.040	TOE
546	7976112.229	503064.388	8.023	TOE
547	7976106.969	503064.869	8.019	TOE
548	7976102.223	503065.077	8.026	TOE
549	7976096.939	503065.336	8.039	TOE
550	7976092.354	503065.682	8.074	TOE
551	7976087.857	503066.082	8.183	TOE
552	7976083.205	503066.166	8.171	TOE
553	7976078.311	503066.556	8.198	TOE
554	7976073.604	503066.969	8.240	TOE
555	7976069.147	503067.182	8.214	TOE
556	7976065.778	503067.420	8.230	TOE
557	7976062.031	503067.793	8.252	TOE

Point No.	Northing	Easting	Elevation	Location
558	7976059.745	503067.491	8.256	TOE
559	7976058.195	503067.332	8.298	TOE
560	7976058.451	503068.130	8.187	SPOT
561	7976060.851	503068.336	8.215	SPOT
562	7976064.306	503068.211	8.208	SPOT
563	7976068.181	503067.941	8.168	SPOT
564	7976072.700	503067.573	8.172	SPOT
565	7976076.907	503067.231	8.132	SPOT
566	7976081.569	503066.717	8.123	SPOT
567	7976086.109	503066.707	8.135	SPOT
568	7976090.568	503066.119	8.105	SPOT
569	7976094.739	503065.852	8.070	SPOT
570	7976098.493	503065.677	8.037	SPOT
571	7976102.059	503065.655	7.995	SPOT
572	7976106.233	503065.392	7.993	SPOT
573	7976110.801	503064.963	7.991	SPOT
574	7976114.959	503064.638	7.941	SPOT
575	7976118.646	503064.330	7.968	SPOT
576	7976123.079	503063.995	8.000	SPOT
577	7976126.824	503063.694	7.965	SPOT
578	7976131.658	503063.450	7.933	SPOT
579	7976135.493	503063.376	7.900	SPOT
580	7976139.753	503062.848	7.907	SPOT
581	7976143.546	503062.725	7.840	SPOT
582	7976147.810	503062.673	7.886	SPOT
583	7976151.106	503062.628	7.828	SPOT
584	7976154.860	503062.542	7.843	SPOT
585	7976159.893	503062.429	7.786	SPOT
586	7976163.850	503062.080	7.777	SPOT
587	7976167.899	503062.051	7.752	SPOT
588	7976171.750	503061.811	7.698	SPOT
589	7976175.384	503061.611	7.730	SPOT
590	7976179.063	503061.657	7.712	SPOT
591	7976182.911	503061.532	7.699	SPOT
592	7976187.270	503061.517	7.671	SPOT
593	7976191.454	503061.601	7.661	SPOT
594	7976195.254	503061.678	7.585	SPOT
595	7976198.540	503061.576	7.557	SPOT
596	7976201.827	503061.239	7.567	SPOT
597	7976204.177	503061.247	7.573	SPOT
598	7976207.634	503061.205	7.601	SPOT
599	7976210.975	503061.109	7.591	SPOT
600	7976213.972	503061.084	7.580	SPOT
601	7976217.233	503061.004	7.590	SPOT
602	7976219.564	503061.060	7.563	SPOT
603	7976222.262	503061.018	7.579	SPOT
604	7976225.415	503060.977	7.573	SPOT
605	7976228.777	503060.956	7.557	SPOT
606	7976232.692	503060.986	7.497	SPOT
607	7976236.560	503060.870	7.484	SPOT
608	7976239.526	503060.687	7.456	SPOT
609	7976243.044	503060.569	7.476	SPOT
610	7976246.546	503060.412	7.445	SPOT

Point No.	Northing	Easting	Elevation	Location
611	7976249.971	503060.206	7.460	SPOT
612	7976254.027	503060.025	7.453	SPOT
613	7976258.131	503059.929	7.383	SPOT
614	7976263.242	503059.515	7.209	SPOT
615	7976267.820	503059.316	7.074	SPOT
616	7976271.462	503058.999	7.001	SPOT
617	7976274.913	503058.873	6.954	SPOT
618	7976278.782	503058.595	6.854	SPOT
619	7976281.587	503059.205	6.805	SPOT
620	7976284.972	503059.212	6.795	SPOT
621	7976287.129	503059.163	6.422	SPOT
622	7976290.346	503059.985	5.974	SPOT
623	7976292.365	503057.604	5.607	SPOT
624	7976293.764	503055.747	5.307	SPOT
625	7976295.740	503054.229	5.193	SPOT
626	7976289.557	503052.076	7.736	CREST
627	7976288.785	503054.229	7.797	CREST
628	7976286.264	503055.500	7.815	CREST
629	7976281.361	503054.751	7.660	CREST
630	7976278.550	503050.069	7.763	CREST
631	7976276.510	503047.007	7.733	CREST
632	7976275.525	503045.584	7.722	CREST
633	7976274.899	503045.891	7.383	TOE
634	7976276.688	503049.134	7.293	TOE
635	7976277.932	503052.217	7.137	TOE
636	7976279.450	503055.058	7.035	TOE
637	7976280.817	503056.799	7.039	TOE
638	7976280.283	503056.471	7.057	SPOT
639	7976278.964	503054.703	7.025	SPOT
640	7976277.809	503052.463	7.085	SPOT
641	7976276.920	503050.202	7.167	SPOT
642	7976275.698	503047.804	7.328	SPOT
643	7976275.058	503046.317	7.402	SPOT
644	7976274.730	503046.416	7.427	TOE
645	7976276.405	503049.736	7.270	TOE
646	7976277.470	503052.391	7.143	TOE
647	7976278.212	503054.691	7.054	TOE
648	7976279.631	503056.178	7.032	TOE
649	7976280.076	503057.216	7.062	TOE
650	7976279.465	503057.081	7.285	CREST
651	7976277.612	503056.030	7.714	CREST
652	7976275.046	503054.871	8.419	CREST
653	7976273.005	503054.650	8.746	CREST
654	7976269.165	503054.597	8.904	CREST
655	7976263.161	503054.915	8.986	CREST
656	7976257.267	503055.452	9.064	CREST
657	7976251.027	503055.782	9.226	CREST
658	7976245.525	503055.936	9.233	CREST
659	7976239.763	503056.227	9.333	CREST
660	7976233.578	503056.918	9.232	CREST
661	7976228.155	503057.048	9.370	CREST
662	7976222.212	503056.655	9.493	CREST
663	7976215.857	503056.670	9.584	CREST

Point No.	Northing	Easting	Elevation	Location
664	7976210.219	503056.970	9.622	CREST
665	7976204.651	503056.803	9.713	CREST
666	7976198.622	503057.404	9.589	CREST
667	7976192.093	503058.010	9.376	CREST
668	7976186.197	503057.836	9.528	CREST
669	7976179.892	503058.042	9.394	CREST
670	7976172.783	503058.481	9.432	CREST
671	7976165.975	503059.008	9.403	CREST
672	7976158.032	503058.628	9.510	CREST
673	7976151.645	503058.680	9.621	CREST
674	7976144.919	503058.799	9.641	CREST
675	7976138.053	503059.035	9.631	CREST
676	7976131.198	503059.960	9.634	CREST
677	7976124.745	503060.111	9.602	CREST
678	7976118.229	503060.359	9.813	CREST
679	7976110.326	503061.336	9.758	CREST
680	7976103.561	503061.816	9.810	CREST
681	7976096.211	503062.185	9.756	CREST
682	7976088.479	503062.709	9.838	CREST
683	7976081.389	503063.445	9.821	CREST
684	7976073.810	503063.631	9.892	CREST
685	7976066.339	503064.675	9.548	CREST
686	7976060.770	503064.615	9.519	CREST
687	7976058.611	503064.339	9.525	CREST
688	7976058.502	503063.735	9.355	TOE
689	7976064.044	503063.838	9.375	TOE
690	7976069.624	503063.326	9.507	TOE
691	7976076.705	503062.888	9.495	TOE
692	7976083.627	503062.480	9.490	TOE
693	7976090.423	503061.641	9.536	TOE
694	7976097.713	503061.314	9.498	TOE
695	7976103.746	503061.373	9.603	TOE
696	7976109.808	503060.326	9.448	TOE
697	7976117.459	503059.403	9.385	TOE
698	7976124.307	503059.360	9.232	TOE
699	7976131.023	503059.007	9.261	TOE
700	7976138.525	503058.335	9.247	TOE
701	7976145.170	503058.126	9.213	TOE
702	7976152.452	503057.688	9.240	TOE
703	7976160.203	503058.050	9.109	TOE
704	7976167.565	503058.402	9.088	TOE
705	7976174.934	503057.055	9.085	TOE
706	7976181.801	503056.965	9.168	TOE
707	7976190.229	503057.265	9.097	TOE
708	7976197.050	503057.226	9.410	TOE
709	7976203.715	503056.030	9.381	TOE
710	7976210.877	503056.248	9.305	TOE
711	7976217.866	503055.902	9.361	TOE
712	7976224.271	503056.167	9.328	TOE
713	7976231.227	503056.226	9.192	TOE
714	7976237.798	503055.834	9.197	TOE
715	7976244.951	503055.779	9.168	TOE
716	7976250.648	503054.983	8.981	TOE

Point No.	Northing	Easting	Elevation	Location
717	7976257.312	503055.058	8.981	TOE
718	7976263.929	503054.567	8.889	TOE
719	7976269.507	503054.089	8.766	TOE
720	7976272.593	503053.744	8.750	TOE
721	7976273.707	503053.714	8.713	CREST
722	7976272.872	503051.642	8.627	CREST
723	7976272.350	503049.432	8.441	CREST
724	7976269.282	503048.607	8.598	CREST
725	7976264.090	503048.687	8.867	CREST
726	7976259.238	503050.750	8.795	CREST
727	7976254.766	503051.287	8.590	CREST
728	7976249.144	503051.615	8.557	CREST
729	7976244.204	503052.967	9.176	CREST
730	7976237.244	503053.817	9.264	CREST
731	7976230.422	503053.129	9.250	CREST
732	7976227.321	503053.254	9.393	CREST
733	7976222.182	503053.400	9.474	CREST
734	7976217.198	503053.533	9.399	CREST
735	7976208.869	503053.309	9.473	CREST
736	7976204.769	503053.082	9.220	CREST
737	7976197.463	503053.417	9.149	CREST
738	7976188.677	503053.471	9.244	CREST
739	7976180.134	503053.354	9.221	CREST
740	7976171.384	503053.634	9.416	CREST
741	7976160.583	503054.119	9.193	CREST
742	7976154.242	503054.001	9.523	CREST
743	7976145.080	503054.329	9.340	CREST
744	7976134.994	503053.455	9.642	CREST
745	7976127.624	503054.081	9.503	CREST
746	7976119.884	503053.972	9.274	CREST
747	7976114.724	503053.787	9.544	CREST
748	7976107.026	503055.724	9.814	CREST
749	7976098.322	503056.478	9.611	CREST
750	7976089.624	503056.080	9.650	CREST
751	7976082.675	503056.121	9.568	CREST
752	7976075.431	503057.658	9.725	CREST
753	7976068.420	503059.224	9.437	CREST
754	7976063.072	503059.256	9.241	CREST
755	7976059.749	503058.705	9.193	CREST
756	7976059.069	503062.112	9.298	SPOT
757	7976068.397	503061.916	9.481	SPOT
758	7976077.990	503060.990	9.542	SPOT
759	7976087.904	503060.116	9.585	SPOT
760	7976096.871	503059.577	9.518	SPOT
761	7976106.631	503058.999	9.406	SPOT
762	7976115.398	503058.127	9.362	SPOT
763	7976125.807	503057.556	9.104	SPOT
764	7976134.441	503057.068	9.141	SPOT
765	7976144.714	503056.504	9.263	SPOT
766	7976154.815	503056.598	9.275	SPOT
767	7976164.466	503056.520	9.128	SPOT
768	7976174.956	503056.017	9.162	SPOT
769	7976184.642	503055.789	9.303	SPOT

Point No.	Northing	Easting	Elevation	Location
770	7976194.265	503055.669	9.280	SPOT
771	7976204.030	503055.363	9.314	SPOT
772	7976213.937	503055.071	9.262	SPOT
773	7976223.495	503054.797	9.334	SPOT
774	7976232.466	503055.027	9.151	SPOT
775	7976241.799	503054.310	9.105	SPOT
776	7976251.746	503054.010	8.930	SPOT
777	7976260.630	503052.960	8.959	SPOT
778	7976268.513	503051.876	8.667	SPOT
779	7976271.566	503051.481	8.679	SPOT
780	7976278.360	503055.131	7.110	TOE
781	7976276.001	503053.302	7.690	TOE
782	7976274.952	503052.512	7.779	TOE
783	7976273.588	503048.941	7.856	TOE
784	7976269.257	503047.232	7.958	TOE
785	7976260.532	503048.886	8.141	TOE
786	7976254.701	503050.206	8.163	TOE
787	7976251.458	503051.479	8.350	TOE
788	7976248.035	503050.668	8.308	TOE
789	7976242.681	503051.027	8.460	TOE
790	7976236.458	503051.320	8.510	TOE
791	7976230.929	503051.705	8.588	TOE
792	7976224.965	503051.068	8.457	TOE
793	7976218.482	503051.359	8.596	TOE
794	7976210.276	503051.592	8.522	TOE
795	7976200.303	503052.159	8.523	TOE
796	7976190.353	503052.269	8.524	TOE
797	7976180.469	503052.424	8.785	TOE
798	7976169.752	503052.573	8.800	TOE
799	7976158.781	503052.548	8.741	TOE
800	7976147.795	503051.937	8.831	TOE
801	7976140.990	503052.372	8.696	TOE
802	7976130.730	503052.029	8.717	TOE
803	7976121.740	503052.485	8.682	TOE
804	7976109.952	503052.830	8.694	TOE
805	7976099.956	503054.221	8.898	TOE
806	7976089.561	503054.612	8.928	TOE
807	7976080.810	503054.489	8.947	TOE
808	7976072.083	503056.220	8.914	TOE
809	7976063.690	503058.214	8.978	TOE
810	7976060.141	503057.987	8.993	TOE
811	7976058.894	503050.060	8.807	SPOT
812	7976069.922	503048.801	8.923	SPOT
813	7976080.211	503047.764	8.845	SPOT
814	7976090.337	503046.291	8.876	SPOT
815	7976101.001	503045.763	8.826	SPOT
816	7976107.894	503045.156	8.832	SPOT
817	7976117.534	503045.055	8.806	SPOT
818	7976128.966	503045.944	8.715	SPOT
819	7976139.629	503046.662	8.558	SPOT
820	7976148.957	503046.578	8.480	SPOT
821	7976158.777	503046.449	8.822	SPOT
822	7976168.038	503046.116	8.586	SPOT

Point No.	Northing	Easting	Elevation	Location
823	7976178.137	503046.220	8.560	SPOT
824	7976188.224	503046.257	8.409	SPOT
825	7976198.118	503046.876	8.446	SPOT
826	7976208.135	503046.412	8.463	SPOT
827	7976217.629	503046.705	8.486	SPOT
828	7976226.847	503046.857	8.520	SPOT
829	7976236.335	503047.236	8.467	SPOT
830	7976244.964	503046.030	8.389	SPOT
831	7976253.564	503045.284	8.153	SPOT
832	7976262.321	503044.289	8.010	SPOT
833	7976267.244	503043.270	7.614	SPOT
834	7976272.523	503042.169	7.914	SPOT
835	7976279.619	503040.379	7.970	SPOT
836	7976282.738	503047.100	8.038	SPOT
837	7976285.310	503052.725	8.006	SPOT
838	7976298.017	503065.821	7.950	SPOT
839	7976288.626	503067.051	7.984	SPOT
840	7976278.866	503067.072	8.066	SPOT
841	7976268.349	503067.591	8.306	SPOT
842	7976259.471	503067.832	8.408	SPOT
843	7976248.272	503068.456	8.722	SPOT
844	7976240.983	503068.591	8.821	SPOT
845	7976231.080	503069.520	9.180	SPOT
846	7976221.609	503070.290	9.499	SPOT
847	7976213.375	503070.224	9.715	SPOT
848	7976203.001	503070.535	9.922	SPOT
849	7976192.502	503071.115	10.111	SPOT
850	7976183.095	503071.285	10.358	SPOT
851	7976176.182	503071.386	10.154	SPOT
852	7976168.738	503071.545	10.210	SPOT
853	7976155.635	503071.330	10.086	SPOT
854	7976145.373	503071.594	9.977	SPOT
855	7976133.773	503072.424	9.833	SPOT
856	7976123.667	503072.614	9.716	SPOT
857	7976114.754	503073.638	9.803	SPOT
858	7976105.226	503074.056	9.770	SPOT
859	7976096.463	503075.027	9.735	SPOT
860	7976087.581	503076.752	9.635	SPOT
861	7976077.623	503076.640	9.548	SPOT
862	7976068.789	503077.256	9.369	SPOT
863	7976062.487	503078.302	9.280	SPOT
864	7976062.939	503085.376	9.670	SPOT
865	7976073.262	503084.212	9.753	SPOT
866	7976083.774	503083.041	9.767	SPOT
867	7976095.176	503082.150	9.824	SPOT
868	7976104.494	503081.480	9.933	SPOT
869	7976114.210	503081.006	9.910	SPOT
870	7976124.558	503080.974	9.845	SPOT
871	7976135.132	503081.102	9.844	SPOT
872	7976145.831	503080.765	10.115	SPOT
873	7976157.753	503080.561	10.091	SPOT
874	7976169.197	503080.574	10.264	SPOT
875	7976180.379	503080.251	10.067	SPOT

Point No.	Northing	Easting	Elevation	Location
876	7976191.145	503079.956	10.244	SPOT
877	7976202.582	503079.573	10.127	SPOT
878	7976213.217	503079.510	10.152	SPOT
879	7976223.225	503079.380	10.081	SPOT
880	7976233.357	503079.157	9.777	SPOT
881	7976244.136	503079.004	9.456	SPOT
882	7976254.909	503078.997	9.377	SPOT
883	7976262.868	503078.272	8.893	SPOT
884	7976271.329	503078.510	8.637	SPOT
885	7976281.150	503077.928	8.213	SPOT
886	7976289.496	503077.118	8.269	SPOT
887	7976295.930	503075.988	8.147	SPOT
888	7976051.992	503068.760	9.224	SPOT
889	7976051.965	503068.705	9.239	CREST
890	7976042.832	503064.028	9.058	CREST
891	7976033.375	503059.874	9.091	CREST
892	7976022.689	503057.971	9.032	CREST
893	7976011.987	503059.706	8.962	CREST
894	7976001.803	503061.504	9.133	CREST
895	7975993.434	503063.195	9.155	CREST
896	7975993.314	503061.605	8.402	TOE
897	7976002.154	503059.825	8.418	TOE
898	7976010.286	503058.590	8.396	TOE
899	7976018.045	503057.084	8.370	TOE
900	7976025.063	503056.245	8.280	TOE
901	7976033.032	503058.223	8.311	TOE
902	7976040.536	503061.583	8.316	TOE
903	7976048.841	503065.413	8.301	TOE
904	7976055.695	503068.386	8.294	TOE
905	7976055.739	503067.537	8.228	SPOT
906	7976047.370	503063.724	8.251	SPOT
907	7976039.052	503059.849	8.220	SPOT
908	7976030.479	503056.541	8.229	SPOT
909	7976021.862	503055.867	8.297	SPOT
910	7976013.817	503057.333	8.330	SPOT
911	7976004.626	503059.156	8.365	SPOT
912	7975996.392	503060.412	8.330	SPOT
913	7975993.123	503061.102	8.349	SPOT
914	7975993.035	503060.365	8.445	TOE
915	7976002.549	503058.835	8.448	TOE
916	7976011.585	503057.221	8.461	TOE
917	7976020.484	503055.188	8.389	TOE
918	7976028.763	503054.911	8.320	TOE
919	7976036.643	503057.907	8.299	TOE
920	7976044.110	503061.163	8.260	TOE
921	7976052.065	503065.069	8.282	TOE
922	7976057.393	503067.115	8.331	TOE
923	7976058.387	503064.342	9.555	CREST
924	7976048.518	503060.464	9.737	CREST
925	7976039.165	503056.346	9.699	CREST
926	7976028.311	503052.456	9.469	CREST
927	7976018.994	503052.579	9.479	CREST
928	7976009.113	503054.572	9.755	CREST

Point No.	Northing	Easting	Elevation	Location
929	7975999.495	503056.208	9.898	CREST
930	7975992.639	503057.396	9.731	CREST
931	7975992.120	503054.625	9.285	TOE
932	7976001.869	503052.752	9.272	TOE
933	7976011.547	503051.144	9.212	TOE
934	7976020.563	503049.538	9.172	TOE
935	7976030.048	503049.381	9.044	TOE
936	7976037.598	503052.035	8.999	TOE
937	7976045.599	503054.819	8.905	TOE
938	7976051.810	503057.926	8.945	TOE
939	7976058.488	503059.297	8.947	TOE
940	7976058.589	503059.797	9.180	CREST
941	7976051.710	503058.893	9.204	CREST
942	7976043.529	503054.923	9.272	CREST
943	7976034.196	503051.801	9.241	CREST
944	7976024.565	503049.933	9.280	CREST
945	7976016.186	503051.802	9.660	CREST
946	7976006.654	503054.036	10.038	CREST
947	7975997.256	503055.759	9.915	CREST
948	7975987.789	503056.108	9.431	CREST
949	7975978.267	503057.908	9.556	CREST
950	7975968.233	503059.680	9.696	CREST
951	7975991.793	503056.180	9.427	SPOT
952	7975998.949	503055.757	9.895	SPOT
953	7976008.737	503053.998	9.817	SPOT
954	7976019.205	503051.785	9.463	SPOT
955	7976029.933	503051.301	9.333	SPOT
956	7976039.745	503054.640	9.224	SPOT
957	7976048.603	503058.253	9.269	SPOT
958	7976058.698	503061.500	9.168	SPOT
959	7976060.528	503044.677	8.795	SPOT
960	7976049.177	503043.601	8.875	SPOT
961	7976038.253	503042.512	8.944	SPOT
962	7976027.326	503042.773	9.090	SPOT
963	7976016.254	503044.430	9.166	SPOT
964	7976005.811	503045.504	9.244	SPOT
965	7975994.636	503047.849	9.355	SPOT
966	7975994.058	503064.346	9.240	SPOT
967	7976004.545	503062.602	9.210	SPOT
968	7976014.054	503061.226	9.041	SPOT
969	7976022.826	503060.162	9.102	SPOT
970	7976030.633	503062.235	9.177	SPOT
971	7976039.836	503065.129	9.087	SPOT
972	7976047.681	503070.204	9.287	SPOT
973	7976055.054	503074.026	9.147	SPOT
974	7975980.564	503084.276	10.024	SPOT
975	7975991.295	503084.364	9.899	SPOT
976	7976002.323	503084.133	9.779	SPOT
977	7976012.797	503084.025	9.662	SPOT
978	7976023.180	503083.042	9.597	SPOT
979	7976033.606	503083.386	9.599	SPOT
980	7976044.617	503083.521	9.553	SPOT
981	7976054.939	503084.092	9.609	SPOT

Point No.	Northing	Easting	Elevation	Location
982	7976061.208	503083.592	9.638	SPOT
983	7975983.939	503065.440	9.301	CREST
984	7975974.106	503067.579	9.305	CREST
985	7975964.855	503069.772	9.527	CREST
986	7975954.875	503071.551	9.565	CREST
987	7975944.962	503073.630	9.518	CREST
988	7975935.247	503075.248	9.599	CREST
989	7975925.133	503077.013	9.591	CREST
990	7975915.192	503077.576	9.550	CREST
991	7975906.128	503076.705	9.506	CREST
992	7975896.899	503073.617	9.232	CREST
993	7975887.100	503071.795	9.267	CREST
994	7975877.027	503072.030	9.440	CREST
995	7975866.361	503073.826	9.477	CREST
996	7975856.211	503077.095	9.584	CREST
997	7975845.535	503079.538	9.883	CREST
998	7975834.231	503079.416	9.780	CREST
999	7975824.997	503080.336	9.903	CREST
1000	7975815.920	503080.680	9.940	CREST
1001	7975806.466	503080.868	9.862	CREST
1002	7975795.795	503081.847	9.887	CREST
1003	7975786.463	503084.887	10.054	CREST
1004	7975778.500	503089.120	10.361	CREST
1005	7975778.164	503088.109	9.833	TOE
1006	7975785.158	503084.523	9.393	TOE
1007	7975791.173	503080.834	9.146	TOE
1008	7975800.289	503079.768	9.067	TOE
1009	7975809.603	503078.993	8.932	TOE
1010	7975818.903	503078.639	8.967	TOE
1011	7975829.061	503077.992	8.848	TOE
1012	7975838.326	503077.748	8.878	TOE
1013	7975847.645	503077.308	8.791	TOE
1014	7975856.070	503075.496	8.757	TOE
1015	7975864.822	503072.911	8.706	TOE
1016	7975874.626	503071.019	8.713	TOE
1017	7975884.649	503070.135	8.628	TOE
1018	7975894.317	503071.267	8.431	TOE
1019	7975904.053	503073.740	8.414	TOE
1020	7975913.578	503075.287	8.430	TOE
1021	7975922.631	503074.850	8.375	TOE
1022	7975931.063	503073.870	8.407	TOE
1023	7975940.218	503072.084	8.435	TOE
1024	7975948.771	503070.435	8.460	TOE
1025	7975957.365	503068.784	8.371	TOE
1026	7975965.517	503067.246	8.382	TOE
1027	7975974.858	503065.405	8.352	TOE
1028	7975982.587	503063.908	8.381	TOE
1029	7975989.603	503062.287	8.363	TOE
1030	7975993.009	503061.483	8.331	TOE
1031	7975992.979	503061.112	8.350	SPOT
1032	7975984.943	503062.673	8.342	SPOT
1033	7975976.021	503064.594	8.291	SPOT
1034	7975967.330	503066.328	8.302	SPOT

Point No.	Northing	Easting	Elevation	Location
1035	7975956.963	503068.325	8.327	SPOT
1036	7975947.744	503070.205	8.362	SPOT
1037	7975938.772	503071.723	8.393	SPOT
1038	7975929.670	503073.460	8.338	SPOT
1039	7975920.636	503074.266	8.290	SPOT
1040	7975910.779	503074.371	8.366	SPOT
1041	7975900.768	503072.178	8.414	SPOT
1042	7975890.625	503070.057	8.470	SPOT
1043	7975880.753	503069.558	8.598	SPOT
1044	7975870.224	503071.035	8.653	SPOT
1045	7975860.724	503073.188	8.737	SPOT
1046	7975851.038	503076.184	8.769	SPOT
1047	7975841.470	503077.124	8.822	SPOT
1048	7975830.812	503077.316	8.856	SPOT
1049	7975821.266	503077.972	8.887	SPOT
1050	7975811.878	503078.286	8.914	SPOT
1051	7975801.097	503078.953	8.967	SPOT
1052	7975790.209	503080.072	9.045	SPOT
1053	7975782.075	503084.773	9.220	SPOT
1054	7975777.731	503087.474	9.760	SPOT
1055	7975777.358	503086.673	9.810	TOE
1056	7975785.741	503080.907	9.320	TOE
1057	7975790.530	503078.480	9.277	TOE
1058	7975801.004	503078.135	9.083	TOE
1059	7975811.323	503077.659	8.920	TOE
1060	7975820.744	503077.400	8.881	TOE
1061	7975830.623	503076.820	8.868	TOE
1062	7975839.459	503076.536	8.886	TOE
1063	7975848.945	503075.708	8.802	TOE
1064	7975857.960	503072.986	8.760	TOE
1065	7975868.529	503070.694	8.691	TOE
1066	7975878.425	503069.080	8.611	TOE
1067	7975889.391	503069.213	8.509	TOE
1068	7975899.586	503071.308	8.365	TOE
1069	7975909.869	503073.281	8.445	TOE
1070	7975919.891	503073.637	8.309	TOE
1071	7975928.750	503072.745	8.358	TOE
1072	7975938.077	503071.205	8.449	TOE
1073	7975948.379	503069.628	8.431	TOE
1074	7975959.753	503067.074	8.452	TOE
1075	7975968.656	503065.157	8.504	TOE
1076	7975977.586	503063.500	8.426	TOE
1077	7975987.063	503061.764	8.422	TOE
1078	7975995.556	503059.898	8.470	TOE
1079	7975985.003	503059.150	9.774	CREST
1080	7975974.039	503061.571	9.920	CREST
1081	7975964.660	503063.340	9.841	CREST
1082	7975956.251	503064.971	9.994	CREST
1083	7975946.789	503067.369	9.758	CREST
1084	7975937.534	503068.555	9.893	CREST
1085	7975928.929	503069.651	10.232	CREST
1086	7975920.563	503070.330	10.179	CREST
1087	7975911.194	503070.690	10.194	CREST

Point No.	Northing	Easting	Elevation	Location
1088	7975901.911	503068.652	10.163	CREST
1089	7975892.912	503066.941	10.094	CREST
1090	7975885.001	503066.391	9.971	CREST
1091	7975876.157	503066.817	10.168	CREST
1092	7975867.568	503068.003	10.118	CREST
1093	7975859.776	503069.750	10.281	CREST
1094	7975852.452	503071.832	10.582	CREST
1095	7975842.552	503072.997	10.578	CREST
1096	7975832.635	503073.224	10.618	CREST
1097	7975822.362	503073.804	10.776	CREST
1098	7975812.136	503074.501	10.510	CREST
1099	7975802.149	503075.156	10.519	CREST
1100	7975793.216	503075.070	10.927	CREST
1101	7975784.597	503079.140	10.549	CREST
1102	7975778.443	503083.280	10.675	CREST
1103	7975776.783	503085.278	10.631	CREST
1104	7975777.382	503083.269	10.511	CREST
1105	7975784.522	503078.053	10.418	CREST
1106	7975791.625	503074.279	10.853	CREST
1107	7975797.733	503073.370	10.497	CREST
1108	7975804.223	503072.709	10.596	CREST
1109	7975805.956	503073.911	10.862	CREST
1110	7975804.409	503073.753	10.530	SPOT
1111	7975800.135	503074.081	10.501	SPOT
1112	7975795.175	503074.654	10.455	SPOT
1113	7975790.785	503074.909	10.677	SPOT
1114	7975785.399	503078.131	10.452	SPOT
1115	7975780.327	503081.506	10.702	SPOT
1116	7975777.526	503083.862	10.514	SPOT
1117	7975776.104	503083.600	9.825	TOE
1118	7975783.671	503077.084	9.878	TOE
1119	7975791.877	503071.907	9.873	TOE
1120	7975801.445	503071.058	9.823	TOE
1121	7975810.948	503072.292	9.737	TOE
1122	7975819.600	503071.689	9.720	TOE
1123	7975828.805	503070.737	9.625	TOE
1124	7975837.128	503070.554	9.606	TOE
1125	7975845.514	503070.523	9.535	TOE
1126	7975853.722	503068.944	9.409	TOE
1127	7975861.398	503067.056	9.363	TOE
1128	7975870.645	503065.199	9.363	TOE
1129	7975881.104	503064.482	9.070	TOE
1130	7975888.529	503064.663	9.033	TOE
1131	7975897.734	503065.501	9.053	TOE
1132	7975908.193	503068.113	9.104	TOE
1133	7975916.407	503067.851	9.019	TOE
1134	7975927.029	503067.600	9.040	TOE
1135	7975935.461	503066.651	9.296	TOE
1136	7975937.490	503066.298	9.438	CREST
1137	7975945.647	503065.482	9.672	CREST
1138	7975953.172	503064.236	9.781	CREST
1139	7975963.306	503060.716	9.738	CREST
1140	7975971.524	503059.460	9.693	CREST

Point No.	Northing	Easting	Elevation	Location
1141	7975980.675	503057.894	9.646	CREST
1142	7975992.013	503055.245	9.564	CREST
1143	7975991.832	503056.028	9.407	SPOT
1144	7975981.326	503058.279	9.478	SPOT
1145	7975970.578	503060.322	9.633	SPOT
1146	7975960.423	503062.850	9.692	SPOT
1147	7975950.862	503065.348	9.662	SPOT
1148	7975940.639	503067.161	9.665	SPOT
1149	7975936.477	503068.082	9.797	SPOT
1150	7975936.454	503064.886	9.028	TOE
1151	7975945.139	503063.192	9.070	TOE
1152	7975954.180	503060.688	9.127	TOE
1153	7975964.011	503057.960	9.059	TOE
1154	7975974.637	503056.712	9.164	TOE
1155	7975983.911	503055.579	9.122	TOE
1156	7975992.345	503054.519	9.238	TOE
1157	7975992.623	503044.859	9.333	SPOT
1158	7975981.861	503047.472	9.225	SPOT
1159	7975971.254	503049.754	8.903	SPOT
1160	7975960.463	503051.089	8.939	SPOT
1161	7975949.694	503050.368	8.940	SPOT
1162	7975938.853	503050.744	8.961	SPOT
1163	7975927.979	503051.999	8.948	SPOT
1164	7975917.112	503053.618	8.978	SPOT
1165	7975905.640	503054.818	9.017	SPOT
1166	7975894.002	503055.626	9.022	SPOT
1167	7975882.768	503056.198	9.057	SPOT
1168	7975871.401	503057.416	9.133	SPOT
1169	7975860.312	503058.315	8.993	SPOT
1170	7975850.277	503059.934	9.034	SPOT
1171	7975839.895	503059.633	9.194	SPOT
1172	7975829.049	503059.525	9.242	SPOT
1173	7975819.348	503060.035	9.280	SPOT
1174	7975809.584	503060.847	9.344	SPOT
1175	7975799.398	503062.067	9.536	SPOT
1176	7975789.160	503064.201	9.670	SPOT
1177	7975778.886	503068.259	9.807	SPOT
1178	7975768.913	503069.727	9.553	SPOT
1179	7975766.468	503081.913	9.421	SPOT
1180	7975766.220	503084.262	9.376	SPOT
1181	7975774.555	503082.597	9.783	SPOT
1182	7975779.804	503090.949	10.355	SPOT
1183	7975789.909	503089.542	10.376	SPOT
1184	7975800.752	503088.993	10.491	SPOT
1185	7975811.229	503087.584	10.595	SPOT
1186	7975821.838	503088.613	10.582	SPOT
1187	7975831.892	503088.395	10.667	SPOT
1188	7975842.573	503087.284	10.698	SPOT
1189	7975852.027	503087.486	10.671	SPOT
1190	7975862.405	503087.251	10.583	SPOT
1191	7975872.073	503087.066	10.581	SPOT
1192	7975882.548	503086.769	10.435	SPOT
1193	7975893.950	503086.493	10.317	SPOT

Point No.	Northing	Easting	Elevation	Location
1194	7975904.870	503086.196	10.386	SPOT
1195	7975916.132	503085.406	10.376	SPOT
1196	7975926.504	503084.582	10.343	SPOT
1197	7975937.412	503083.942	10.296	SPOT
1198	7975947.001	503083.612	10.220	SPOT
1199	7975957.062	503082.838	10.239	SPOT
1200	7975967.041	503083.222	10.170	SPOT
1201	7975974.043	503083.628	10.055	SPOT
1202	7975983.259	503083.928	10.012	SPOT
1203	7975778.461	503089.118	10.354	CREST
1204	7975767.325	503092.715	10.269	CREST
1205	7975756.993	503094.044	10.157	CREST
1206	7975746.611	503095.435	10.001	CREST
1207	7975736.224	503097.663	9.945	CREST
1208	7975732.423	503099.295	9.837	CREST
1209	7975722.888	503103.650	9.886	CREST
1210	7975713.752	503109.908	9.881	CREST
1211	7975708.308	503117.405	9.956	CREST
1212	7975703.931	503126.624	10.126	CREST
1213	7975700.671	503136.200	10.085	CREST
1214	7975700.519	503146.948	10.087	CREST
1215	7975700.957	503157.890	10.157	CREST
1216	7975701.599	503168.755	10.187	CREST
1217	7975702.552	503179.165	10.247	CREST
1218	7975704.063	503189.524	10.382	CREST
1219	7975704.558	503193.433	10.451	CREST
1220	7975703.547	503193.689	10.104	TOE
1221	7975702.404	503183.823	9.993	TOE
1222	7975701.347	503173.999	10.062	TOE
1223	7975700.766	503163.557	10.026	TOE
1224	7975700.245	503152.964	9.980	TOE
1225	7975699.917	503143.607	9.928	TOE
1226	7975700.403	503133.962	9.902	TOE
1227	7975703.991	503124.486	9.893	TOE
1228	7975709.258	503115.210	9.914	TOE
1229	7975709.052	503114.972	9.921	SPOT
1230	7975704.415	503122.833	9.802	SPOT
1231	7975700.947	503131.451	9.873	SPOT
1232	7975699.658	503140.701	9.850	SPOT
1233	7975699.930	503150.447	9.919	SPOT
1234	7975700.363	503159.925	10.026	SPOT
1235	7975700.874	503169.403	10.006	SPOT
1236	7975701.666	503179.402	9.979	SPOT
1237	7975702.558	503188.479	9.986	SPOT
1238	7975703.254	503193.414	10.020	SPOT
1239	7975703.006	503193.719	10.029	TOE
1240	7975701.942	503184.571	9.948	TOE
1241	7975701.009	503175.178	10.058	TOE
1242	7975700.242	503165.288	10.060	TOE
1243	7975699.812	503155.903	10.032	TOE
1244	7975699.392	503145.453	9.913	TOE
1245	7975699.585	503135.211	9.878	TOE
1246	7975702.453	503126.577	9.947	TOE

Point No.	Northing	Easting	Elevation	Location
1247	7975707.012	503117.550	9.836	TOE
1248	7975713.206	503109.161	9.874	TOE
1249	7975719.727	503104.111	9.814	TOE
1250	7975727.486	503099.756	9.787	TOE
1251	7975736.228	503096.712	9.836	TOE
1252	7975745.127	503094.335	9.665	TOE
1253	7975753.601	503093.049	9.761	TOE
1254	7975760.992	503091.789	9.831	TOE
1255	7975769.571	503089.604	9.780	TOE
1256	7975775.955	503087.450	9.816	TOE
1257	7975776.972	503087.888	9.758	SPOT
1258	7975767.510	503091.041	9.788	SPOT
1259	7975758.651	503092.583	9.777	SPOT
1260	7975748.108	503094.084	9.673	SPOT
1261	7975739.826	503095.859	9.746	SPOT
1262	7975733.852	503097.760	9.778	SPOT
1263	7975733.644	503098.227	9.779	TOE
1264	7975742.352	503095.381	9.725	TOE
1265	7975750.623	503093.867	9.737	TOE
1266	7975759.248	503092.688	9.814	TOE
1267	7975767.570	503091.252	9.759	TOE
1268	7975777.538	503088.413	9.885	TOE
1269	7975776.193	503085.858	10.535	CREST
1270	7975730.754	503107.747	9.855	CHK
1271	7975774.446	503086.342	10.625	CREST
1272	7975770.367	503088.322	10.501	CREST
1273	7975758.310	503090.884	10.223	CREST
1274	7975750.730	503092.490	10.078	CREST
1275	7975741.924	503094.443	10.076	CREST
1276	7975732.783	503097.354	10.119	CREST
1277	7975724.344	503100.783	10.204	CREST
1278	7975716.597	503105.491	10.408	CREST
1279	7975710.919	503111.082	10.234	CREST
1280	7975705.858	503118.594	10.143	CREST
1281	7975701.531	503126.240	10.459	CREST
1282	7975699.009	503135.430	10.275	CREST
1283	7975698.805	503144.387	10.273	CREST
1284	7975699.182	503153.619	10.228	CREST
1285	7975699.598	503166.122	10.359	CREST
1286	7975700.570	503176.949	10.290	CREST
1287	7975700.993	503187.129	10.400	CREST
1288	7975701.938	503193.817	10.535	CREST
1289	7975701.020	503193.924	10.180	TOE
1290	7975700.409	503187.276	10.319	TOE
1291	7975699.494	503173.820	10.159	TOE
1292	7975698.641	503164.944	9.991	TOE
1293	7975698.078	503154.567	9.935	TOE
1294	7975697.504	503143.335	9.848	TOE
1295	7975697.654	503132.857	10.040	TOE
1296	7975701.411	503122.412	9.907	TOE
1297	7975708.426	503112.459	9.997	TOE
1298	7975719.249	503101.256	9.880	TOE
1299	7975734.510	503095.180	9.730	TOE

Point No.	Northing	Easting	Elevation	Location
1300	7975748.295	503091.772	9.770	TOE
1301	7975760.099	503087.928	9.248	TOE
1302	7975764.532	503086.930	9.339	TOE
1303	7975772.625	503084.286	9.702	TOE
1304	7975775.967	503083.754	9.818	TOE
1305	7975773.243	503081.270	9.792	SPOT
1306	7975765.198	503083.531	9.247	SPOT
1307	7975749.125	503089.920	9.901	SPOT
1308	7975737.305	503091.314	9.608	SPOT
1309	7975728.295	503093.214	9.725	SPOT
1310	7975719.745	503096.530	9.797	SPOT
1311	7975713.994	503102.101	10.006	SPOT
1312	7975708.233	503108.127	10.647	SPOT
1313	7975703.349	503115.275	10.537	SPOT
1314	7975698.188	503123.201	10.105	SPOT
1315	7975695.706	503131.149	9.850	SPOT
1316	7975695.810	503140.372	9.777	SPOT
1317	7975696.979	503148.288	9.847	SPOT
1318	7975697.741	503158.977	9.989	SPOT
1319	7975698.343	503167.043	10.126	SPOT
1320	7975699.162	503180.016	10.206	SPOT
1321	7975700.700	503189.652	10.358	SPOT
1322	7975700.698	503193.469	10.247	SPOT
1323	7975707.840	503194.585	10.380	SPOT
1324	7975706.355	503183.755	10.322	SPOT
1325	7975705.548	503173.716	10.306	SPOT
1326	7975704.774	503163.697	10.266	SPOT
1327	7975704.258	503153.114	10.164	SPOT
1328	7975704.060	503142.325	10.102	SPOT
1329	7975705.729	503132.165	10.097	SPOT
1330	7975709.403	503123.030	10.084	SPOT
1331	7975716.317	503114.415	10.033	SPOT
1332	7975724.186	503108.581	10.051	SPOT
1333	7975733.212	503103.631	9.915	SPOT
1334	7975741.956	503099.958	9.990	SPOT
1335	7975751.145	503097.866	10.085	SPOT
1336	7975760.206	503096.357	10.164	SPOT
1337	7975769.719	503094.931	10.300	SPOT
1338	7975779.102	503093.513	10.384	SPOT
1339	7976349.148	503226.216	9.637	CREST
1340	7976347.788	503224.802	9.319	CREST
1341	7976347.467	503216.566	9.505	CREST
1342	7976346.507	503207.085	9.653	CREST
1343	7976345.913	503196.436	9.713	CREST
1344	7976345.607	503186.348	9.708	CREST
1345	7976345.091	503175.667	9.678	CREST
1346	7976345.878	503165.581	9.211	CREST
1347	7976345.542	503155.818	9.006	CREST
1348	7976343.451	503145.523	8.947	CREST
1349	7976341.273	503135.490	8.959	CREST
1350	7976337.941	503125.819	8.864	CREST
1351	7976333.671	503117.219	8.815	CREST
1352	7976326.474	503109.618	8.921	CREST

Point No.	Northing	Easting	Elevation	Location
1353	7976318.765	503102.215	8.840	CREST
1354	7976310.866	503095.713	8.860	CREST
1355	7976303.614	503088.364	8.467	CREST
1356	7976299.232	503082.913	8.020	CREST
1357	7976297.622	503081.437	8.095	CREST
1358	7976299.438	503077.663	7.720	CREST
1359	7976299.253	503076.027	7.575	CREST
1360	7976297.564	503071.383	7.513	CREST
1361	7976300.018	503064.167	7.563	CREST
1362	7976305.163	503062.268	5.474	TOE
1363	7976304.579	503067.035	5.223	TOE
1364	7976300.042	503070.797	6.200	TOE
1365	7976299.691	503073.235	6.573	TOE
1366	7976300.094	503078.161	7.420	TOE
1367	7976302.425	503083.197	7.701	TOE
1368	7976308.362	503091.406	7.946	TOE
1369	7976316.246	503097.805	8.022	TOE
1370	7976323.646	503104.237	8.088	TOE
1371	7976329.075	503110.151	8.147	TOE
1372	7976335.263	503117.345	8.250	TOE
1373	7976338.809	503124.931	8.304	TOE
1374	7976341.755	503132.592	8.328	TOE
1375	7976344.326	503142.838	8.320	TOE
1376	7976346.440	503153.023	8.454	TOE
1377	7976347.490	503163.849	8.459	TOE
1378	7976347.310	503174.331	8.506	TOE
1379	7976347.287	503184.714	8.653	TOE
1380	7976347.857	503194.671	8.568	TOE
1381	7976348.370	503204.806	8.739	TOE
1382	7976348.867	503214.173	8.731	TOE
1383	7976348.871	503224.120	8.787	TOE
1384	7976350.032	503224.186	8.783	TOE
1385	7976349.828	503214.417	8.756	TOE
1386	7976349.423	503203.875	8.604	TOE
1387	7976348.707	503191.985	8.509	TOE
1388	7976348.226	503182.462	8.610	TOE
1389	7976348.367	503171.962	8.428	TOE
1390	7976348.527	503162.018	8.422	TOE
1391	7976347.242	503151.507	8.405	TOE
1392	7976344.795	503141.563	8.280	TOE
1393	7976342.324	503130.937	8.347	TOE
1394	7976338.874	503122.106	8.261	TOE
1395	7976338.880	503122.116	8.250	TOE
1396	7976333.088	503113.286	8.196	TOE
1397	7976326.627	503106.207	8.071	TOE
1398	7976319.930	503099.484	7.999	TOE
1399	7976312.537	503093.757	8.041	TOE
1400	7976305.649	503086.820	7.869	TOE
1401	7976301.101	503079.236	7.526	TOE
1402	7976301.307	503074.971	6.931	TOE
1403	7976300.108	503072.366	6.381	TOE
1404	7976301.858	503070.358	5.845	TOE
1405	7976304.889	503067.467	5.131	TOE

Point No.	Northing	Easting	Elevation	Location
1406	7976307.622	503066.720	5.333	TOE
1407	7976305.642	503066.654	5.205	SPOT
1408	7976302.304	503069.689	5.633	SPOT
1409	7976300.144	503071.137	6.159	SPOT
1410	7976300.959	503074.717	6.827	SPOT
1411	7976300.466	503078.473	7.447	SPOT
1412	7976302.820	503083.333	7.634	SPOT
1413	7976309.023	503091.403	7.915	SPOT
1414	7976316.492	503097.473	8.010	SPOT
1415	7976324.057	503104.205	8.045	SPOT
1416	7976330.711	503111.374	8.158	SPOT
1417	7976336.932	503119.411	8.205	SPOT
1418	7976340.957	503128.649	8.317	SPOT
1419	7976343.625	503138.197	8.331	SPOT
1420	7976345.696	503147.979	8.387	SPOT
1421	7976347.628	503158.721	8.394	SPOT
1422	7976347.827	503167.725	8.410	SPOT
1423	7976347.644	503177.515	8.496	SPOT
1424	7976347.921	503187.526	8.555	SPOT
1425	7976348.600	503197.882	8.593	SPOT
1426	7976349.143	503209.018	8.678	SPOT
1427	7976349.185	503217.710	8.750	SPOT
1428	7976349.366	503223.412	8.766	SPOT
1429	7976350.015	503225.962	9.702	CREST
1430	7976351.966	503224.241	9.782	CREST
1431	7976351.829	503216.870	9.851	CREST
1432	7976352.384	503207.300	9.879	CREST
1433	7976351.447	503198.921	9.905	CREST
1434	7976351.295	503189.998	10.040	CREST
1435	7976350.808	503180.204	9.901	CREST
1436	7976350.685	503170.437	9.727	CREST
1437	7976350.177	503160.218	9.566	CREST
1438	7976348.723	503149.754	9.328	CREST
1439	7976347.169	503140.472	9.677	CREST
1440	7976344.902	503131.152	9.532	CREST
1441	7976341.447	503122.485	9.572	CREST
1442	7976337.684	503115.171	9.608	CREST
1443	7976332.199	503108.997	9.614	CREST
1444	7976325.231	503101.322	9.637	CREST
1445	7976317.849	503094.931	9.459	CREST
1446	7976310.355	503089.349	8.908	CREST
1447	7976304.832	503082.040	8.758	CREST
1448	7976303.278	503078.967	8.515	CREST
1449	7976304.549	503073.700	8.004	CREST
1450	7976307.729	503072.370	7.949	CREST
1451	7976305.777	503077.251	8.284	SPOT
1452	7976303.920	503078.996	8.534	CREST
1453	7976309.552	503087.395	8.871	CREST
1454	7976316.872	503093.187	9.387	CREST
1455	7976322.863	503098.183	9.716	CREST
1456	7976330.456	503104.940	9.694	CREST
1457	7976336.429	503112.480	9.689	CREST
1458	7976341.732	503121.303	9.413	CREST

Point No.	Northing	Easting	Elevation	Location
1459	7976345.017	503126.240	9.999	CREST
1460	7976347.022	503132.785	9.727	CREST
1461	7976348.107	503139.995	9.682	CREST
1462	7976349.313	503148.361	9.421	CREST
1463	7976351.057	503157.966	9.475	CREST
1464	7976352.104	503168.252	9.744	CREST
1465	7976351.855	503178.161	9.974	CREST
1466	7976352.491	503187.265	10.330	CREST
1467	7976352.392	503197.540	9.894	CREST
1468	7976353.588	503201.818	9.840	CREST
1469	7976354.497	503209.654	9.543	CREST
1470	7976357.018	503216.874	8.992	CREST
1471	7976358.317	503218.716	9.040	CREST
1472	7976356.041	503219.779	9.479	CREST
1473	7976353.487	503221.523	9.891	CREST
1474	7976352.708	503224.472	9.780	CREST
1475	7976350.910	503225.874	9.744	CREST
1476	7976350.625	503225.593	9.725	SPOT
1477	7976352.214	503224.416	9.735	SPOT
1478	7976353.284	503213.093	9.584	SPOT
1479	7976352.950	503203.503	9.740	SPOT
1480	7976352.307	503193.154	9.834	SPOT
1481	7976351.629	503184.092	10.022	SPOT
1482	7976351.432	503173.565	9.784	SPOT
1483	7976351.268	503164.401	9.674	SPOT
1484	7976349.908	503154.562	9.408	SPOT
1485	7976348.371	503144.067	9.450	SPOT
1486	7976346.947	503135.955	9.664	SPOT
1487	7976343.895	503126.338	9.515	SPOT
1488	7976339.785	503118.258	9.386	SPOT
1489	7976334.586	503110.826	9.695	SPOT
1490	7976327.641	503103.064	9.643	SPOT
1491	7976321.544	503097.082	9.686	SPOT
1492	7976313.107	503091.154	9.089	SPOT
1493	7976306.694	503083.834	8.809	SPOT
1494	7976303.936	503079.462	8.689	SPOT
1495	7976304.392	503078.133	8.310	TOE
1496	7976306.582	503081.891	8.386	TOE
1497	7976310.282	503087.186	8.496	TOE
1498	7976319.060	503093.657	8.844	TOE
1499	7976327.180	503100.136	9.421	TOE
1500	7976334.698	503108.330	9.195	TOE
1501	7976340.740	503117.602	9.056	TOE
1502	7976346.687	503125.999	9.171	TOE
1503	7976348.754	503135.276	9.301	TOE
1504	7976349.986	503147.546	9.133	TOE
1505	7976351.861	503159.058	9.050	TOE
1506	7976353.620	503168.279	9.391	TOE
1507	7976353.738	503175.234	9.327	TOE
1508	7976353.465	503181.830	9.806	TOE
1509	7976356.683	503188.212	7.583	TOE
1510	7976358.339	503198.355	7.287	TOE
1511	7976358.281	503207.959	7.118	TOE

Point No.	Northing	Easting	Elevation	Location
1512	7976359.966	503215.138	7.250	TOE
1513	7976361.447	503217.383	8.385	SPOT
1514	7976361.555	503218.287	7.935	TOE
1515	7976355.912	503221.217	8.886	TOE
1516	7976353.228	503225.695	9.145	TOE
1517	7976350.286	503226.346	9.549	TOE
1518	7976349.425	503228.107	9.622	SPOT
1519	7976357.040	503225.331	8.780	SPOT
1520	7976362.412	503221.004	8.079	SPOT
1521	7976362.838	503218.379	7.866	SPOT
1522	7976362.222	503214.244	7.139	SPOT
1523	7976362.494	503204.803	7.031	SPOT
1524	7976362.268	503194.772	7.190	SPOT
1525	7976361.204	503184.318	7.538	SPOT
1526	7976359.653	503175.736	7.725	SPOT
1527	7976355.837	503166.143	9.348	SPOT
1528	7976355.465	503155.255	9.078	SPOT
1529	7976354.957	503143.664	9.078	SPOT
1530	7976354.179	503138.416	9.086	SPOT
1531	7976353.616	503127.898	9.214	SPOT
1532	7976347.181	503118.813	9.226	SPOT
1533	7976340.324	503110.484	9.231	SPOT
1534	7976332.297	503102.595	9.474	SPOT
1535	7976324.212	503094.777	9.301	SPOT
1536	7976315.484	503086.229	8.860	SPOT
1537	7976308.571	503078.258	8.401	SPOT
1538	7976306.734	503075.662	8.236	SPOT
1539	7976295.617	503077.243	8.214	SPOT
1540	7976292.772	503082.628	8.290	SPOT
1541	7976298.868	503090.619	8.462	SPOT
1542	7976304.760	503099.448	8.332	SPOT
1543	7976311.228	503106.540	8.715	SPOT
1544	7976318.045	503115.363	8.865	SPOT
1545	7976325.126	503126.346	9.142	SPOT
1546	7976333.918	503139.793	9.445	SPOT
1547	7976336.685	503148.160	9.381	SPOT
1548	7976337.424	503158.235	9.286	SPOT
1549	7976337.906	503168.701	9.376	SPOT
1550	7976338.005	503178.377	9.699	SPOT
1551	7976337.382	503189.950	9.706	SPOT
1552	7976337.461	503200.678	9.716	SPOT
1553	7976337.617	503209.895	9.725	SPOT
1554	7976338.789	503219.402	9.649	SPOT
1555	7976340.286	503227.857	9.624	SPOT
PSCSt0 2744	7975865.551	503165.762	0.000	
PSCSt0 2942	7975867.180	503210.730	0.000	
1556	7976349.353	503227.210	9.593	SPOT
1557	7976345.806	503226.940	9.460	SPOT
1558	7976344.090	503226.553	9.521	SPOT
1559	7976344.099	503229.055	9.482	SPOT
1560	7976347.039	503229.514	9.458	SPOT
1561	7976349.835	503229.227	9.663	SPOT
1562	7976352.510	503228.880	9.398	SPOT

Point No.	Northing	Easting	Elevation	Location
1563	7976356.448	503228.215	8.865	SPOT
1564	7976359.552	503227.282	8.561	SPOT
1565	7976359.427	503225.151	8.464	SPOT
1566	7976355.654	503226.231	8.849	SPOT
1567	7976358.153	503229.345	8.805	SPOT
1568	7976354.839	503230.197	8.994	SPOT
1569	7976350.370	503231.146	9.643	SPOT
1570	7976345.301	503231.193	9.526	SPOT
1571	7976345.620	503234.163	9.485	SPOT
1572	7976345.196	503238.957	9.586	SPOT
1573	7976345.281	503241.883	9.675	SPOT
1574	7976346.264	503246.012	9.722	SPOT
1575	7976350.071	503246.489	9.747	TOE
1576	7976349.732	503243.532	9.619	TOE
1577	7976349.319	503239.304	9.525	TOE
1578	7976347.959	503233.917	9.479	TOE
1579	7976348.891	503233.039	9.754	CREST
1580	7976349.826	503237.403	9.935	CREST
1581	7976350.760	503242.010	10.073	CREST
1582	7976351.114	503247.391	10.184	CREST
1583	7976352.592	503247.278	10.174	CREST
1584	7976351.694	503243.721	10.119	CREST
1585	7976351.476	503238.974	10.012	CREST
1586	7976350.935	503233.169	9.675	CREST
1588	7976350.697	503237.748	9.960	SPOT
1589	7976351.018	503239.678	10.001	SPOT
1590	7976351.142	503242.088	10.115	SPOT
1591	7976351.765	503246.098	10.032	SPOT
1592	7976353.413	503246.327	9.629	TOE
1593	7976352.626	503242.521	9.542	TOE
1594	7976352.663	503238.110	9.486	TOE
1595	7976352.843	503233.868	9.167	TOE
1596	7976354.798	503231.735	9.039	SPOT
1597	7976355.393	503234.453	8.956	SPOT
1598	7976356.547	503238.394	9.474	SPOT
1599	7976356.650	503242.545	9.470	SPOT
1600	7976356.672	503245.090	9.477	SPOT

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Point No.	Northing	Easting	Elevation	Location
2015P001A	7975424.455	503766.105	51.873	REBAR
612	7975692.698	503232.81	10.143	CREST
1	7975692.684	503232.819	10.14	CREST
2	7975696.82	503232.949	10.274	CREST
3	7975701.777	503232.282	10.61	CREST
4	7975701.433	503224.846	10.687	CREST
5	7975701.319	503213.584	10.493	CREST
6	7975701.298	503203.787	10.715	CREST
7	7975701.36	503193.916	10.616	CREST
8	7975700.008	503183.682	10.495	CREST
9	7975699.008	503172.863	10.653	CREST
10	7975698.564	503163.126	10.596	CREST
11	7975697.971	503151.811	10.516	CREST
12	7975697.784	503140.407	10.458	CREST
13	7975699.367	503129.759	10.604	CREST
14	7975702.999	503121.52	10.584	CREST
15	7975707.566	503113.501	10.485	CREST
16	7975714.384	503105.962	10.579	CREST
17	7975723.44	503100.121	10.472	CREST
18	7975732.559	503096.448	10.433	CREST
19	7975742.445	503093.366	10.482	CREST
20	7975751.778	503091.376	10.447	CREST
21	7975760.827	503089.818	10.54	CREST
22	7975769.937	503087.486	10.673	CREST
23	7975774.821	503085.525	10.752	CREST
24	7975776.984	503084.499	10.639	CREST
25	7975777.167	503085.169	10.713	CREST
26	7975768.34	503088.743	10.732	CREST
27	7975758.439	503090.877	10.492	CREST
28	7975749.415	503092.342	10.487	CREST
29	7975742.622	503093.76	10.485	CREST
30	7975733.461	503096.542	10.474	CREST
31	7975724.628	503100.154	10.495	CREST
32	7975716.569	503104.734	10.589	CREST
33	7975709.442	503111.999	10.582	CREST
34	7975703.979	503120.569	10.516	CREST
35	7975699.898	503130.133	10.683	CREST
36	7975698.293	503140.976	10.519	CREST
37	7975698.517	503151.085	10.551	CREST
38	7975699.114	503161.257	10.594	CREST
39	7975699.699	503172.054	10.698	CREST
40	7975700.637	503182.281	10.631	CREST
41	7975701.661	503191.718	10.619	CREST
42	7975702.273	503201	10.85	CREST
43	7975701.748	503210.615	10.495	CREST
44	7975702.15	503220.326	10.493	CREST
45	7975702.761	503229.207	10.639	CREST
46	7975702.929	503232.043	10.584	CREST
47	7975704.347	503232.381	10.427	CREST
48	7975708.496	503230.69	10.263	CREST
49	7975711.88	503228.446	10.052	CREST

Point No.	Northing	Easting	Elevation	Location
50	7975702.359	503231.736	10.616	SPOT
51	7975701.712	503220.205	10.483	SPOT
52	7975701.275	503209.697	10.524	SPOT
53	7975702.096	503199.907	10.847	SPOT
54	7975700.701	503188.566	10.607	SPOT
55	7975699.822	503177.323	10.665	SPOT
56	7975698.824	503166.611	10.722	SPOT
57	7975698.623	503156.2	10.576	SPOT
58	7975698.04	503144.762	10.525	SPOT
59	7975698.469	503134.512	10.567	SPOT
60	7975701.593	503124.694	10.64	SPOT
61	7975706.108	503116.206	10.624	SPOT
62	7975712.015	503108.582	10.74	SPOT
63	7975721.113	503101.657	10.564	SPOT
64	7975734.627	503095.887	10.471	SPOT
65	7975745.764	503092.747	10.452	SPOT
66	7975755.28	503091.202	10.508	SPOT
67	7975765.311	503089.252	10.675	SPOT
68	7975774.774	503086.039	10.773	SPOT
69	7975776.608	503082.457	9.783	TOE
70	7975771.436	503085.165	9.632	TOE
71	7975763.623	503086.932	9.178	TOE
72	7975759.115	503087.782	9.134	TOE
73	7975754.825	503089.704	9.652	TOE
74	7975746.727	503091.228	9.575	TOE
75	7975739.031	503092.893	9.482	TOE
76	7975731.237	503095.609	9.559	TOE
77	7975723.745	503098.787	9.55	TOE
78	7975714.098	503104.879	9.928	TOE
79	7975706.169	503113.742	9.918	TOE
80	7975701.159	503122.765	9.945	TOE
81	7975697.491	503133.315	10.115	TOE
82	7975696.781	503138.649	9.624	TOE
83	7975696.634	503146.793	9.55	TOE
84	7975697.012	503154.408	9.414	TOE
85	7975697.214	503163.403	9.433	TOE
86	7975697.182	503172.711	9.65	TOE
87	7975699.101	503178.892	9.993	TOE
88	7975698.854	503183.638	10.026	TOE
89	7975700.278	503191.967	10.157	TOE
90	7975700.572	503201.105	10.328	TOE
91	7975700.227	503206.495	10.189	TOE
92	7975700.698	503213.414	9.999	TOE
93	7975700.25	503215.638	9.903	TOE
94	7975700.928	503231.341	9.981	TOE
95	7975696.204	503231.849	9.983	TOE
96	7975693.369	503232.474	10.02	TOE
97	7975692.63	503229.455	10.022	SPOT
98	7975695.609	503224.49	9.942	SPOT
99	7975695.583	503216.346	9.926	SPOT
100	7975699.037	503199.247	10.139	SPOT
101	7975698.158	503187.096	9.822	SPOT
102	7975698.023	503181.638	10.06	SPOT

Point No.	Northing	Easting	Elevation	Location
103	7975696.851	503173.321	9.662	SPOT
104	7975696.655	503164.104	9.562	SPOT
105	7975696.563	503155.849	9.56	SPOT
106	7975695.981	503143.482	9.467	SPOT
107	7975696.01	503131.803	9.832	SPOT
108	7975699.387	503121.422	9.982	SPOT
109	7975702.932	503110.943	10.45	SPOT
110	7975712.802	503100.416	9.991	SPOT
111	7975724.798	503093.578	9.782	SPOT
112	7975735.396	503090.67	9.571	SPOT
113	7975739.871	503090.68	9.62	SPOT
114	7975778.213	503086.717	9.709	TOE
115	7975774.264	503088.795	9.724	TOE
116	7975765.813	503091.179	9.839	TOE
117	7975748.967	503093.72	9.814	TOE
118	7975735.568	503097.057	9.863	TOE
119	7975726.598	503100.772	9.754	TOE
120	7975717.495	503105.944	9.85	TOE
121	7975709.851	503113.915	9.798	TOE
122	7975704.172	503123.023	9.848	TOE
123	7975700.116	503133.29	9.938	TOE
124	7975699.41	503144.11	9.923	TOE
125	7975699.829	503154.317	10.041	TOE
126	7975700.262	503165.435	10.088	TOE
127	7975701.212	503175.218	10.074	TOE
128	7975701.953	503185.811	9.948	TOE
129	7975703.325	503195.585	10.07	TOE
130	7975703.278	503202.396	10.212	TOE
131	7975702.589	503212.029	9.991	TOE
132	7975702.98	503221.481	9.962	TOE
133	7975703.673	503226.92	9.991	TOE
134	7975703.788	503230.79	10.116	TOE
135	7975705.147	503227.799	9.996	TOE
136	7975708.714	503225.46	9.928	TOE
137	7975710.53	503224.973	9.966	TOE
138	7975709.805	503223.033	9.959	SPOT
139	7975706.834	503222.217	9.926	SPOT
140	7975703.513	503214.853	9.993	SPOT
141	7975703.37	503205.477	10.149	SPOT
142	7975703.53	503195.532	10.05	SPOT
143	7975701.973	503185.031	9.958	SPOT
144	7975701.279	503175.172	10.012	SPOT
145	7975700.522	503165.524	10.051	SPOT
146	7975700.108	503155.695	9.966	SPOT
147	7975699.627	503145.827	9.919	SPOT
148	7975699.924	503135.671	9.906	SPOT
149	7975703.155	503125.564	9.898	SPOT
150	7975707.899	503116.919	9.82	SPOT
151	7975714.37	503108.677	9.85	SPOT
152	7975722.176	503103.161	9.808	SPOT
153	7975732.032	503098.902	9.764	SPOT
154	7975740.691	503095.767	9.775	SPOT
155	7975749.229	503093.889	9.742	SPOT

Point No.	Northing	Easting	Elevation	Location
156	7975759.636	503092.409	9.829	SPOT
157	7975768.516	503090.642	9.783	SPOT
158	7975778.318	503087.194	9.646	SPOT
159	7975778.89	503087.528	9.67	TOE
160	7975772.859	503089.925	9.764	TOE
161	7975763.54	503092.29	9.9	TOE
162	7975753.775	503093.777	9.867	TOE
163	7975744.652	503095.082	9.706	TOE
164	7975735.284	503097.625	9.812	TOE
165	7975725.818	503101.95	9.806	TOE
166	7975717.687	503106.394	9.867	TOE
167	7975712.632	503111.207	9.903	TOE
168	7975706.705	503119.192	9.847	TOE
169	7975702.675	503127.435	9.951	TOE
170	7975700.003	503137.178	9.93	TOE
171	7975700.002	503148.508	9.932	TOE
172	7975700.59	503158.986	10.035	TOE
173	7975701.071	503168.483	10.054	TOE
174	7975701.912	503177.636	10.086	TOE
175	7975702.462	503187.364	9.996	TOE
176	7975703.829	503195.641	10.087	TOE
177	7975704.083	503201.733	10.153	TOE
178	7975704.843	503203.117	10.212	CREST
179	7975704.129	503192.707	10.389	CREST
180	7975702.754	503181.819	10.212	CREST
181	7975701.799	503170.857	10.119	CREST
182	7975701.025	503160.9	10.153	CREST
183	7975700.652	503150.54	10.075	CREST
184	7975700.423	503139.888	10.05	CREST
185	7975702.592	503129.674	10.167	CREST
186	7975707.839	503118.726	10.045	CREST
187	7975714.29	503110.419	9.941	CREST
188	7975723.374	503103.782	9.883	CREST
189	7975732.451	503099.304	9.825	CREST
190	7975742.393	503095.763	9.901	CREST
191	7975752.329	503094.419	10.035	CREST
192	7975761.712	503093.259	10.14	CREST
193	7975770.806	503091.591	10.219	CREST
194	7975779.299	503089.281	10.401	CREST
195	7975779.932	503093.076	10.392	SPOT
196	7975769.279	503094.799	10.286	SPOT
197	7975758.259	503096.814	10.2	SPOT
198	7975747.028	503099.129	10.124	SPOT
199	7975735.463	503102.527	9.97	SPOT
200	7975725.835	503107.967	10.083	SPOT
201	7975716.71	503115.148	10.032	SPOT
202	7975709.635	503124.982	10.073	SPOT
203	7975706.037	503136.479	10.061	SPOT
204	7975704.923	503147.46	10.033	SPOT
205	7975704.908	503158.713	10.202	SPOT
206	7975705.431	503169.434	10.225	SPOT
207	7975706.668	503180.07	10.282	SPOT
208	7975707.272	503190.083	10.411	SPOT

Point No.	Northing	Easting	Elevation	Location
209	7975708.206	503200.169	10.368	SPOT
210	7975708.185	503210.738	10.089	SPOT
211	7975709.373	503216.709	9.971	SPOT
212	7975713.572	503224.276	9.991	TOE
213	7975716.003	503227.241	9.969	TOE
214	7975717.031	503234.05	10.051	TOE
215	7975717.778	503242.759	10.143	TOE
216	7975716.935	503249.818	10.236	TOE
217	7975709.899	503251.957	10.526	TOE
218	7975704.888	503251.798	10.497	TOE
219	7975703.909	503251.426	10.53	TOE
220	7975702.943	503250.125	10.686	CREST
221	7975702.567	503244.857	10.74	CREST
222	7975702.359	503238.364	10.69	CREST
223	7975702.472	503233.245	10.582	CREST
224	7975702.392	503232.565	10.551	CREST
225	7975704.57	503232.952	10.47	SPOT
226	7975709.853	503233.823	10.296	SPOT
227	7975711.529	503237.453	10.304	SPOT
228	7975712.209	503242.627	10.4	SPOT
229	7975711.203	503245.996	10.43	SPOT
230	7975706.835	503246.587	10.666	SPOT
231	7975705.611	503244.385	10.731	SPOT
232	7975698.791	503247.401	10.65	SPOT
233	7975692.193	503248.088	10.377	SPOT
234	7975688.906	503246.183	10.386	SPOT
235	7975686.861	503241.463	10.319	SPOT
236	7975687.055	503239.29	10.325	SPOT
237	7975690.926	503237.873	10.357	SPOT
238	7975695.455	503237.217	10.412	SPOT
239	7975688.332	503234.805	10.223	TOE
240	7975683.409	503234.872	10.186	TOE
241	7975680.254	503240.273	10.196	TOE
242	7975680.795	503245.401	10.256	TOE
243	7975681.595	503251.324	10.253	TOE
244	7975695.795	503251.656	10.175	TOE
245	7975701.738	503252.163	10.232	TOE
246	7975695.51	503250.164	10.553	CREST
247	7975698.445	503250.725	10.66	CREST
248	7975702.204	503251.182	10.773	CREST
249	7975702.641	503250.207	10.706	SPOT
250	7975703.353	503251.043	10.828	CREST
251	7975704.243	503259.628	10.895	CREST
252	7975705.072	503270.027	10.944	CREST
253	7975705.401	503280.096	10.969	CREST
254	7975704.454	503289.505	10.956	CREST
255	7975704.776	503298.474	10.946	CREST
256	7975703.685	503307.819	11.001	CREST
257	7975700.745	503316.736	11.35	CREST
258	7975699.937	503325.796	11.382	CREST
259	7975699.608	503330.351	11.376	CREST
260	7975699.069	503332.29	11.332	CREST
261	7975697.662	503332.063	11.26	CREST

Point No.	Northing	Easting	Elevation	Location
262	7975698.771	503329.512	11.44	CREST
263	7975698.97	503320.529	11.459	CREST
264	7975701.73	503309.483	11.08	CREST
265	7975703.722	503299.572	10.97	CREST
266	7975703.821	503289.37	10.895	CREST
267	7975704.513	503279.509	10.899	CREST
268	7975704.517	503279.505	10.919	CREST
269	7975704.235	503269.457	10.94	CREST
270	7975703.398	503259.668	10.939	CREST
271	7975702.512	503251.557	10.771	CREST
272	7975702.999	503251.854	10.837	SPOT
273	7975703.876	503259.847	10.902	SPOT
274	7975704.651	503269.604	10.945	SPOT
275	7975705.014	503279.613	10.955	SPOT
276	7975704.161	503289.216	10.948	SPOT
277	7975704.384	503299.039	10.926	SPOT
278	7975702.782	503308.807	11.093	SPOT
279	7975699.94	503317.822	11.363	SPOT
280	7975699.412	503326.544	11.389	SPOT
281	7975698.979	503330.827	11.392	SPOT
282	7975697.288	503331.177	10.861	TOE
283	7975698.155	503323.34	10.776	TOE
284	7975699.009	503316.303	10.583	TOE
285	7975700.619	503308.909	10.203	TOE
286	7975702.265	503302.684	10.194	TOE
287	7975702.204	503294.522	10.107	TOE
288	7975703.269	503283.229	10.313	TOE
289	7975703.269	503272.35	10.268	TOE
290	7975703.045	503263.844	10.266	TOE
291	7975702.031	503254.913	10.298	TOE
292	7975701.664	503252.147	10.224	TOE
293	7975700.83	503252.574	10.209	SPOT
294	7975700.431	503260.52	10.227	SPOT
295	7975701.511	503275.44	10.183	SPOT
296	7975701.067	503284.35	10.049	SPOT
297	7975696.07	503295.772	10.105	SPOT
298	7975693.481	503305.144	10.146	SPOT
299	7975694.913	503315.531	10.348	SPOT
300	7975696.329	503324.829	10.804	SPOT
301	7975695.577	503330.438	10.93	SPOT
302	7975684.385	503339.384	10.881	SPOT
303	7975681.307	503343.646	11.011	SPOT
304	7975686.339	503340.422	11.068	CREST
305	7975692.948	503336.489	11.317	CREST
306	7975697.646	503332.048	11.257	CREST
307	7975698.84	503332.748	11.309	CREST
308	7975703.313	503330.203	10.866	CREST
309	7975700.99	503330.264	10.911	TOE
310	7975701.304	503323.907	10.727	TOE
311	7975702.615	503314.957	10.542	TOE
312	7975705.441	503306.466	10.422	TOE
313	7975705.628	503293.649	10.313	TOE
314	7975706.066	503285.448	10.301	TOE

Point No.	Northing	Easting	Elevation	Location
315	7975706.582	503280.067	10.243	TOE
316	7975706.463	503274.438	10.21	TOE
317	7975705.992	503267.697	10.261	TOE
318	7975705.317	503261.156	10.282	TOE
319	7975703.784	503251.801	10.449	TOE
320	7975705.888	503252.621	10.476	SPOT
321	7975706.91	503260.729	10.331	SPOT
322	7975708.144	503269.452	10.37	SPOT
323	7975708.693	503277.795	10.299	SPOT
324	7975708.968	503285.453	10.318	SPOT
325	7975709.055	503293.838	10.451	SPOT
326	7975708.248	503302.364	10.417	SPOT
327	7975707.773	503310.573	10.551	SPOT
328	7975706.273	503321.265	10.653	SPOT
329	7975708.724	503325.347	10.611	SPOT
330	7975713.344	503316.068	10.508	SPOT
331	7975715.711	503305.352	10.337	SPOT
332	7975716.373	503296.071	10.259	SPOT
333	7975716.636	503288.269	10.369	SPOT
334	7975716.283	503281.167	10.386	SPOT
335	7975715.6	503272.303	10.443	SPOT
336	7975715.268	503263.556	10.395	SPOT
337	7975715.052	503255.971	10.341	SPOT
338	7975703.053	503418.359	10.84	CREST
339	7975703.322	503410.431	10.81	CREST
340	7975701.982	503400.859	10.822	CREST
341	7975701.286	503391.238	10.839	CREST
342	7975700.725	503382.271	10.872	CREST
343	7975700.078	503373.639	10.958	CREST
344	7975700.031	503365.136	11.095	CREST
345	7975699.274	503357.026	11.211	CREST
346	7975698.294	503347.725	11.353	CREST
347	7975697.885	503338.502	11.207	CREST
348	7975698.202	503334.309	11.218	CREST
349	7975697.144	503331.297	10.875	TOE
350	7975692.409	503335.68	10.922	TOE
351	7975687.062	503338.538	10.892	TOE
352	7975685.594	503340.039	10.892	TOE
353	7975688.457	503347.635	11.004	TOE
354	7975689.325	503357.075	11.003	TOE
355	7975690.757	503366.154	10.847	TOE
356	7975691.821	503374.949	10.657	TOE
357	7975691.482	503384.382	10.525	TOE
358	7975691.418	503394.157	10.418	TOE
359	7975691.728	503404.541	10.537	TOE
360	7975693.329	503414.379	10.422	TOE
361	7975693.885	503414.86	10.464	CREST
362	7975698.466	503416.77	10.685	CREST
363	7975701.993	503419.192	10.762	CREST
364	7975705.332	503419.947	10.734	CREST
365	7975704.377	503420.061	10.611	TOE
366	7975706.76	503420.052	10.476	TOE
367	7975710.114	503420.251	10.466	TOE

Point No.	Northing	Easting	Elevation	Location
368	7975712.589	503418.527	10.48	TOE
369	7975713.655	503407.79	10.466	TOE
370	7975712.886	503396.435	10.413	TOE
371	7975710.625	503384.879	10.455	TOE
372	7975708.249	503375.531	10.482	TOE
373	7975706.535	503367.581	10.486	TOE
374	7975708.859	503359.14	10.582	TOE
375	7975707.688	503349.685	10.861	TOE
376	7975709.343	503341.605	10.836	TOE
377	7975708.45	503330.337	10.701	TOE
378	7975705.725	503328.57	10.774	TOE
379	7975702.256	503329.709	10.859	TOE
380	7975706.345	503331.827	10.762	SPOT
381	7975706.373	503343.019	10.85	SPOT
382	7975706.156	503354.702	10.857	SPOT
383	7975706.064	503365.471	10.554	SPOT
384	7975706.455	503375.593	10.483	SPOT
385	7975706.453	503385.937	10.577	SPOT
386	7975705.919	503396.064	10.773	SPOT
387	7975706.661	503407.024	10.664	SPOT
388	7975705.544	503416.357	10.732	SPOT
389	7975701.143	503414.919	10.756	SPOT
390	7975699.064	503404.2	10.828	SPOT
391	7975698.011	503393.746	10.781	SPOT
392	7975696.969	503382.395	10.793	SPOT
393	7975696.631	503380.908	10.808	SPOT
394	7975696.36	503375.319	10.889	SPOT
395	7975695.428	503369.073	10.999	SPOT
396	7975694.722	503364.85	11.09	SPOT
397	7975693.272	503358.272	11.092	SPOT
398	7975691.957	503350.179	11.083	SPOT
399	7975690.345	503341.801	11.195	SPOT
400	7975682.277	503344.293	10.952	SPOT
401	7975685.012	503355.148	11.05	SPOT
402	7975685.37	503365.15	10.884	SPOT
403	7975686.952	503376.098	10.689	SPOT
404	7975687.759	503385.876	10.54	SPOT
405	7975687.902	503396.279	10.43	SPOT
406	7975688.456	503405.875	10.458	SPOT
407	7975689.283	503410.931	10.467	SPOT
408	7975716.258	503421.346	10.443	SPOT
409	7975715.584	503411.443	10.416	SPOT
410	7975714.965	503400.893	10.368	SPOT
411	7975713.462	503389.546	10.388	SPOT
412	7975712.782	503378.448	10.406	SPOT
413	7975712.259	503367.555	10.434	SPOT
414	7975712.358	503357.437	10.616	SPOT
415	7975712.125	503346.326	10.812	SPOT
416	7975711.08	503335.858	10.756	SPOT
417	7975710.532	503324.838	10.578	SPOT
418	7975714.812	503322.037	10.474	SPOT
419	7975716.126	503333.123	10.7	SPOT
420	7975715.844	503344.037	10.806	SPOT

Point No.	Northing	Easting	Elevation	Location
421	7975714.875	503355.438	10.575	SPOT
422	7975714.105	503366.073	10.467	SPOT
423	7975713.527	503377.776	10.428	SPOT
424	7975713.981	503388.327	10.399	SPOT
425	7975715.446	503399.222	10.359	SPOT
426	7975718.639	503409.964	10.409	SPOT
427	7975720.149	503419.829	10.474	SPOT
428	7975719.819	503426.921	10.463	SPOT
429	7975704.142	503418.254	10.785	SPOT
430	7975702.505	503420.177	11.199	CREST
431	7975710.164	503428.219	11.146	CREST
432	7975717.362	503435.299	11.079	CREST
433	7975725.311	503440.836	11.171	CREST
434	7975733.666	503446.511	11.097	CREST
435	7975741.808	503450.872	10.965	CREST
436	7975750.457	503453.741	11.038	CREST
437	7975759.282	503457.654	10.92	CREST
438	7975770.626	503458.398	10.874	CREST
439	7975780.678	503457.878	10.86	CREST
440	7975791.427	503457.322	10.857	CREST
441	7975802.32	503457.254	10.802	CREST
442	7975813.481	503456.419	10.751	CREST
443	7975823.032	503456.437	10.853	CREST
444	7975833.594	503455.634	10.676	CREST
445	7975844.205	503455.79	10.745	CREST
446	7975853.665	503455.176	10.599	CREST
447	7975863.244	503454.393	10.78	CREST
448	7975872.179	503454.443	11.1	CREST
449	7975874.112	503454.855	11.589	CREST
450	7975874.124	503453.694	11.359	SPOT
451	7975874.026	503453.205	11.363	CREST
452	7975864.378	503453.483	10.608	CREST
453	7975855.067	503454.508	10.622	CREST
454	7975844.808	503455.312	10.724	CREST
455	7975834.531	503455.057	10.674	CREST
456	7975824.075	503455.71	10.784	CREST
457	7975813.712	503455.634	10.743	CREST
458	7975803.519	503456.319	10.814	CREST
459	7975792.206	503456.614	10.753	CREST
460	7975781.507	503457.219	10.811	CREST
461	7975770.565	503457.752	10.818	CREST
462	7975760.266	503457.12	10.948	CREST
463	7975750.067	503452.881	11.04	CREST
464	7975740.029	503449.152	10.968	CREST
465	7975731.475	503444.152	10.94	CREST
466	7975722.177	503437.843	11.048	CREST
467	7975714.215	503431.261	11.014	CREST
468	7975707.35	503424.801	11.292	CREST
469	7975703.437	503421.203	11.269	CREST
470	7975702.853	503419.878	11.184	CREST
471	7975702.809	503420.343	11.197	SPOT
472	7975708.851	503426.552	11.169	SPOT
473	7975716.014	503433.312	11.229	SPOT

Point No.	Northing	Easting	Elevation	Location
474	7975723.526	503439.319	11.207	SPOT
475	7975732.098	503445.179	10.898	SPOT
476	7975741.422	503450.323	11.101	SPOT
477	7975750.594	503453.456	11.024	SPOT
478	7975759.328	503457.478	10.909	SPOT
479	7975770.587	503458.044	10.848	SPOT
480	7975780.486	503457.506	10.856	SPOT
481	7975790.342	503457.051	10.77	SPOT
482	7975799.419	503456.636	10.764	SPOT
483	7975810.887	503456.093	10.734	SPOT
484	7975821.644	503456	10.811	SPOT
485	7975831.824	503455.514	10.658	SPOT
486	7975842.998	503455.566	10.696	SPOT
487	7975853.332	503454.95	10.563	SPOT
488	7975862.881	503454.043	10.701	SPOT
489	7975870.896	503454.076	11.128	SPOT
490	7975874.708	503454.05	11.403	SPOT
491	7975872.603	503454.646	11.142	TOE
492	7975863.395	503455.031	10.52	TOE
493	7975853.248	503455.763	10.24	TOE
494	7975842.045	503456.51	10.274	TOE
495	7975829.72	503456.782	10.304	TOE
496	7975818.13	503457.26	10.455	TOE
497	7975805.978	503457.867	10.465	TOE
498	7975794.424	503457.787	10.464	TOE
499	7975782.942	503458.366	10.456	TOE
500	7975771.984	503458.662	10.501	TOE
501	7975764.456	503458.931	10.601	TOE
502	7975756.156	503457.909	10.156	TOE
503	7975748.866	503455.663	10.134	TOE
504	7975751.982	503458.725	10.237	SPOT
505	7975760.441	503462.264	10.207	SPOT
506	7975766.477	503463.174	10.166	SPOT
507	7975775.974	503461.702	10.553	SPOT
508	7975787.501	503462.237	10.469	SPOT
509	7975798.286	503461.791	10.453	SPOT
510	7975810.003	503460.842	10.365	SPOT
511	7975821.379	503460.899	10.244	SPOT
512	7975833.101	503460.959	10.266	SPOT
513	7975845.688	503459.996	10.22	SPOT
514	7975858.404	503458.452	10.355	SPOT
515	7975862.932	503457.331	10.589	SPOT
516	7975871.045	503451.558	9.95	TOE
517	7975859.803	503452.754	9.921	TOE
518	7975849.269	503453.182	9.982	TOE
519	7975838.482	503453.427	10.044	TOE
520	7975827.591	503453.562	10.103	TOE
521	7975817.06	503453.975	10.173	TOE
522	7975807.052	503454.329	10.156	TOE
523	7975797.283	503454.764	10.096	TOE
524	7975787.681	503455.33	10.212	TOE
525	7975777.328	503455.669	10.201	TOE
526	7975765.917	503456.227	10.28	TOE

Point No.	Northing	Easting	Elevation	Location
527	7975759.05	503455.543	10.33	TOE
528	7975749.993	503451.865	10.484	TOE
529	7975740.622	503448.134	10.526	TOE
530	7975732.418	503443.168	10.499	TOE
531	7975724.402	503437.795	10.421	TOE
532	7975716.681	503431.927	10.291	TOE
533	7975709.951	503425.405	10.3	TOE
534	7975706.008	503421.759	10.463	TOE
535	7975704.282	503420.175	10.605	TOE
536	7975706.37	503420.811	10.499	SPOT
537	7975712.063	503425.7	10.36	SPOT
538	7975714.098	503427.607	10.431	SPOT
539	7975714.17	503428.274	10.454	CREST
540	7975721.861	503435.015	10.472	CREST
541	7975729.694	503440.511	10.612	CREST
542	7975737.611	503445.781	10.65	CREST
543	7975745.616	503449.561	10.653	CREST
544	7975753.907	503452.842	10.567	CREST
545	7975758.332	503454.131	10.522	CREST
546	7975759.887	503454.416	10.535	CREST
547	7975770.51	503452.662	10.528	CREST
548	7975780.991	503452.727	10.433	CREST
549	7975791.703	503452.442	10.351	CREST
550	7975802.205	503451.916	10.341	CREST
551	7975813.093	503451.344	10.368	CREST
552	7975824.087	503450.94	10.311	CREST
553	7975834.543	503450.801	10.282	CREST
554	7975844.629	503450.899	10.153	CREST
555	7975854.599	503450.853	10.27	CREST
556	7975865.01	503450.498	10.186	CREST
557	7975870.119	503449.523	10.098	CREST
558	7975870.382	503450.24	9.824	TOE
559	7975861.013	503451.466	9.937	TOE
560	7975851.712	503451.606	9.97	TOE
561	7975841.631	503452.192	9.976	TOE
562	7975831.77	503452.137	10.094	TOE
563	7975821.394	503452.213	10.139	TOE
564	7975811.039	503452.951	10.133	TOE
565	7975801.035	503453.184	10.125	TOE
566	7975791.49	503453.416	10.17	TOE
567	7975780.648	503453.904	10.203	TOE
568	7975770.408	503454.298	10.254	TOE
569	7975761.65	503455.413	10.258	TOE
570	7975757.627	503454.516	10.354	TOE
571	7975758.384	503454.831	10.376	SPOT
572	7975764.548	503455.523	10.202	SPOT
573	7975774.872	503454.865	10.276	SPOT
574	7975784.476	503454.42	10.253	SPOT
575	7975794.837	503454.27	10.13	SPOT
576	7975805.074	503453.682	10.076	SPOT
577	7975815.8	503453.346	10.107	SPOT
578	7975826.411	503452.969	10.068	SPOT
579	7975836.839	503452.656	9.986	SPOT

Point No.	Northing	Easting	Elevation	Location
580	7975846.83	503452.613	9.892	SPOT
581	7975856.707	503452.246	9.894	SPOT
582	7975860.499	503452.241	9.824	SPOT
583	7975870.26	503450.814	9.84	SPOT
584	7975870.047	503446.369	9.997	SPOT
585	7975860.611	503446.72	10.105	SPOT
586	7975850.828	503446.86	10.152	SPOT
587	7975840.765	503447.178	10.145	SPOT
588	7975830.478	503446.706	10.283	SPOT
589	7975819.393	503446.271	10.28	SPOT
590	7975807.787	503446.563	10.314	SPOT
591	7975796.828	503447.123	10.256	SPOT
592	7975785.931	503447.523	10.379	SPOT
593	7975774.597	503448.146	10.44	SPOT
594	7975763.51	503448.029	10.51	SPOT
595	7975752.879	503446.71	10.485	SPOT
596	7975743.431	503443.408	10.501	SPOT
597	7975734.822	503438.099	10.45	SPOT
598	7975725.994	503430.93	10.441	SPOT
599	7975717.794	503423.851	10.46	SPOT
600	7975712.863	503419.535	10.447	SPOT
601	7975702.141	503422.765	10.383	TOE
602	7975705.281	503425.37	10.322	TOE
603	7975707.45	503428.121	10.148	TOE
604	7975711.832	503431.639	10.27	TOE
605	7975714.709	503435.324	10.159	TOE
606	7975718.196	503438.176	10.097	TOE
607	7975726.946	503443.486	10.275	TOE
608	7975736.593	503449.557	10.151	TOE
609	7975745.943	503454.53	10.138	TOE
610	7975749.557	503455.439	10.143	TOE
611	7975869.826	503449.902	10.097	CREST
613	7975879.291	503446.659	10.202	CREST
614	7975889.035	503444.141	10.127	CREST
615	7975898.222	503442.617	10.37	CREST
616	7975909.204	503442.252	10.311	CREST
617	7975920.07	503441.455	10.369	CREST
618	7975931.723	503441.118	10.445	CREST
619	7975943.149	503440.78	10.336	CREST
620	7975953.775	503439.916	10.536	CREST
621	7975965.252	503439.474	10.521	CREST
622	7975977.081	503438.632	10.335	CREST
623	7975987.769	503438.478	10.172	CREST
624	7975999.312	503437.564	10.133	CREST
625	7976010.138	503436.402	10.031	CREST
626	7976021.053	503436.26	9.931	CREST
627	7976031.632	503436.552	9.888	CREST
628	7976041.824	503436.267	9.825	CREST
629	7976049.362	503436.325	9.795	CREST
630	7976049.202	503436.719	9.61	TOE
631	7976040.284	503437.221	9.597	TOE
632	7976030.323	503437.528	9.649	TOE
633	7976020.623	503437.579	9.66	TOE

Point No.	Northing	Easting	Elevation	Location
634	7976011.751	503437.561	9.686	TOE
635	7976002.047	503438.521	9.672	TOE
636	7975993.151	503439.011	9.711	TOE
637	7975984.468	503439.483	9.782	TOE
638	7975975.188	503439.983	9.844	TOE
639	7975965.805	503440.812	9.796	TOE
640	7975956.429	503441.019	9.829	TOE
641	7975947.435	503441.533	9.814	TOE
642	7975938.492	503442.385	9.82	TOE
643	7975929.186	503442.464	9.912	TOE
644	7975920.115	503442.295	9.858	TOE
645	7975912.126	503442.788	9.832	TOE
646	7975902.299	503443.872	9.925	TOE
647	7975893.654	503443.618	9.848	TOE
648	7975885.193	503445.744	9.827	TOE
649	7975877.164	503448.3	9.853	TOE
650	7975870.457	503450.192	9.821	TOE
651	7975870.662	503450.571	9.81	SPOT
652	7975870.409	503451.534	9.914	TOE
653	7975879.897	503448.413	9.815	TOE
654	7975888.041	503446.055	9.792	TOE
655	7975896.776	503444.772	9.851	TOE
656	7975905.077	503445.074	9.811	TOE
657	7975914.143	503443.965	9.852	TOE
658	7975923.948	503443.571	9.865	TOE
659	7975932.234	503443.721	9.819	TOE
660	7975941.418	503443.284	9.795	TOE
661	7975951.129	503442.624	9.75	TOE
662	7975962.37	503442.371	9.763	TOE
663	7975971.308	503441.737	9.697	TOE
664	7975980.713	503441.159	9.743	TOE
665	7975989.98	503440.543	9.71	TOE
666	7975999.742	503439.88	9.617	TOE
667	7976010.817	503439.413	9.631	TOE
668	7976019.78	503439.447	9.613	TOE
669	7976028.757	503439.095	9.603	TOE
670	7976038.184	503438.781	9.629	TOE
671	7976047.509	503438.533	9.563	TOE
672	7976049.087	503438.517	9.578	TOE
673	7976049.008	503437.932	9.474	SPOT
674	7976038.815	503438.194	9.535	SPOT
675	7976027.946	503438.13	9.578	SPOT
676	7976018.384	503438.021	9.578	SPOT
677	7976008.564	503438.326	9.688	SPOT
678	7975998.243	503439.06	9.641	SPOT
679	7975988.341	503439.872	9.617	SPOT
680	7975977.593	503440.401	9.646	SPOT
681	7975966.904	503441.183	9.684	SPOT
682	7975956.174	503441.764	9.733	SPOT
683	7975945.538	503442.447	9.783	SPOT
684	7975934.542	503443.075	9.783	SPOT
685	7975924.863	503442.742	9.8	SPOT
686	7975914.028	503443.224	9.761	SPOT

Point No.	Northing	Easting	Elevation	Location
687	7975905.477	503444.295	9.78	SPOT
688	7975896.239	503444.205	9.779	SPOT
689	7975886.941	503445.437	9.773	SPOT
690	7975877.874	503448.467	9.835	SPOT
691	7975871.302	503450.507	9.857	SPOT
692	7975873.207	503453.359	11.262	CREST
693	7975882.197	503451.05	11.385	CREST
694	7975892.837	503447.706	11.315	CREST
695	7975903.597	503447.531	11.266	CREST
696	7975915.464	503445.61	10.962	CREST
697	7975925.739	503445.456	10.959	CREST
698	7975936.362	503445.28	10.828	CREST
699	7975947.381	503444.724	10.952	CREST
700	7975958.441	503444.152	10.978	CREST
701	7975969.589	503443.439	10.954	CREST
702	7975980.813	503442.929	10.753	CREST
703	7975991.18	503442.071	10.754	CREST
704	7976000.709	503441.793	10.958	CREST
705	7976010.546	503442.394	10.789	CREST
706	7976021.119	503442.022	10.841	CREST
707	7976031.165	503441.894	10.895	CREST
708	7976040.868	503441.495	10.918	CREST
709	7976049.335	503441.683	10.83	CREST
710	7976049.382	503441.987	10.81	SPOT
711	7976049.421	503442.323	10.773	CREST
712	7976039.538	503442.219	10.872	CREST
713	7976034.553	503442.394	10.906	CREST
714	7976025.198	503442.551	10.83	CREST
715	7976016.398	503443.008	10.913	CREST
716	7976006.885	503442.808	10.814	CREST
717	7975997.626	503442.538	10.833	CREST
718	7975987.354	503443.461	10.815	CREST
719	7975977.288	503443.868	10.881	CREST
720	7975967.467	503444.324	10.983	CREST
721	7975957.327	503445.097	10.968	CREST
722	7975947.292	503445.565	11.039	CREST
723	7975937.079	503446.083	10.837	CREST
724	7975926.967	503446.166	10.908	CREST
725	7975917.085	503446.86	11.039	CREST
726	7975907.706	503447.75	11.245	CREST
727	7975898.37	503448.541	11.627	CREST
728	7975889.337	503449.586	11.379	CREST
729	7975880.355	503452.771	11.38	CREST
730	7975873.467	503455.142	11.542	CREST
731	7975873.537	503454.195	11.366	SPOT
732	7975882.135	503451.587	11.396	SPOT
733	7975891.942	503448.418	11.311	SPOT
734	7975902.208	503448.139	11.368	SPOT
735	7975913.182	503446.458	11.038	SPOT
736	7975924.272	503445.947	10.998	SPOT
737	7975935.369	503445.765	10.774	SPOT
738	7975946.334	503445.187	10.928	SPOT
739	7975957.816	503444.607	10.992	SPOT

Point No.	Northing	Easting	Elevation	Location
740	7975969.079	503443.895	11.057	SPOT
741	7975979.609	503443.333	10.838	SPOT
742	7975989.996	503442.622	10.764	SPOT
743	7976000.096	503442.09	10.992	SPOT
744	7976010.586	503442.605	10.854	SPOT
745	7976020.922	503442.314	10.836	SPOT
746	7976031.312	503442.19	10.881	SPOT
747	7976040.46	503441.821	10.837	SPOT
748	7976048.931	503441.979	10.869	SPOT
749	7976049.283	503443.083	10.33	TOE
750	7976039.068	503443.218	10.391	TOE
751	7976028.128	503443.36	10.36	TOE
752	7976016.278	503444.206	10.366	TOE
753	7976003.602	503443.971	10.164	TOE
754	7975990.628	503444.384	10.293	TOE
755	7975979.475	503444.399	10.435	TOE
756	7975969.176	503445.242	10.496	TOE
757	7975958.417	503445.941	10.508	TOE
758	7975947.894	503446.419	10.45	TOE
759	7975937.08	503446.764	10.421	TOE
760	7975926.399	503447.37	10.428	TOE
761	7975915.484	503447.69	10.535	TOE
762	7975903.965	503449.705	10.622	TOE
763	7975893.407	503450.789	10.705	TOE
764	7975882.879	503453.302	10.762	TOE
765	7975873.359	503456.188	11.031	TOE
766	7975871.993	503456.822	11.025	TOE
767	7975873.219	503460.093	11.009	SPOT
768	7975882.901	503457.648	10.875	SPOT
769	7975892.883	503455.081	10.739	SPOT
770	7975902.71	503453.127	10.665	SPOT
771	7975916.163	503454.164	10.441	SPOT
772	7975926.683	503452.724	10.572	SPOT
773	7975937.399	503451.682	10.444	SPOT
774	7975947.904	503450.473	10.508	SPOT
775	7975958.714	503449.585	10.423	SPOT
776	7975970.22	503448.644	10.427	SPOT
777	7975981.766	503447.938	10.34	SPOT
778	7975993.021	503447.754	10.41	SPOT
779	7976003.729	503447.101	10.269	SPOT
780	7976014.441	503447.464	10.249	SPOT
781	7976025.376	503447.621	10.354	SPOT
782	7976035.849	503447.444	10.235	SPOT
783	7976048.17	503447.067	10.263	SPOT
784	7976049.329	503430.747	10.018	SPOT
785	7976038.363	503430.901	9.879	SPOT
786	7976027.256	503431.388	9.884	SPOT
787	7976015.842	503431.923	9.974	SPOT
788	7976004.579	503432.515	10.142	SPOT
789	7975993.236	503432.963	10.235	SPOT
790	7975981.435	503433.8	10.293	SPOT
791	7975969.895	503434.554	10.449	SPOT
792	7975958.284	503434.973	10.518	SPOT

Point No.	Northing	Easting	Elevation	Location
793	7975946.413	503435.719	10.446	SPOT
794	7975935.195	503436.119	10.364	SPOT
795	7975923.352	503436.736	10.418	SPOT
796	7975911.27	503437.302	10.406	SPOT
797	7975899.192	503438.259	10.407	SPOT
798	7975887.785	503439.584	10.218	SPOT
799	7975876.571	503441.539	10.044	SPOT
800	7975867.842	503443.12	9.945	SPOT
801	7976050.234	503436.068	9.814	CREST
802	7976059.543	503435.636	9.891	CREST
803	7976068.464	503434.674	9.957	CREST
804	7976079.162	503435.228	9.915	CREST
805	7976089.097	503434.598	10.063	CREST
806	7976099.21	503434.016	10.091	CREST
807	7976109.897	503433.631	10.153	CREST
808	7976119.398	503433.822	10.258	CREST
809	7976130.202	503433.835	10.146	CREST
810	7976141.565	503433.571	10.179	CREST
811	7976151.039	503432.646	10.262	CREST
812	7976161.591	503432.021	10.292	CREST
813	7976172.337	503432.076	10.302	CREST
814	7976182.026	503432.561	10.339	CREST
815	7976192.801	503432.753	10.318	CREST
816	7976202.373	503432.781	10.277	CREST
817	7976212.538	503431.652	10.573	CREST
818	7976221.849	503429.474	10.643	CREST
819	7976231.369	503427.87	10.962	CREST
820	7976240.227	503427.718	11.097	CREST
821	7976249.477	503427.688	11.16	CREST
822	7976258.009	503427.693	11.135	CREST
823	7976267.49	503427.204	10.906	CREST
824	7976278.282	503428.941	10.975	CREST
825	7976280.136	503433.03	11.188	CREST
826	7976279.151	503438.034	11.367	CREST
827	7976272.7	503438.669	11.673	CREST
828	7976262.928	503438.766	11.69	CREST
829	7976253.429	503439.166	11.898	CREST
830	7976244.346	503441.156	12.13	CREST
831	7976232.625	503441.672	12.145	CREST
832	7976222.761	503442.475	12.169	CREST
833	7976212.418	503443.015	12.096	CREST
834	7976202.523	503443.139	11.955	CREST
835	7976193.036	503442.617	12.005	CREST
836	7976182.374	503442.349	11.972	CREST
837	7976172.477	503441.87	11.928	CREST
838	7976162.701	503441.851	11.904	CREST
839	7976151.262	503441.744	12.097	CREST
840	7976140.373	503441.787	12.131	CREST
841	7976130.168	503441.99	12.13	CREST
842	7976119.765	503442.143	12.221	CREST
843	7976109.28	503441.752	12.306	CREST
844	7976098.135	503440.879	11.836	CREST
845	7976087.412	503441.396	11.565	CREST

Point No.	Northing	Easting	Elevation	Location
846	7976077.594	503440.949	11.24	CREST
847	7976067.676	503440.713	11.195	CREST
848	7976057.154	503441.847	10.997	CREST
849	7976051.205	503441.458	10.785	CREST
850	7976049.611	503441.63	10.784	CREST
851	7976049.475	503441.984	10.826	SPOT
852	7976049.599	503442.24	10.779	CREST
853	7976060.775	503441.872	10.908	CREST
854	7976069.134	503441.522	11.16	CREST
855	7976078.451	503441.9	11.406	CREST
856	7976088.658	503442.007	11.633	CREST
857	7976098.383	503441.766	11.892	CREST
858	7976108.929	503442.695	12.256	CREST
859	7976119.728	503442.757	12.209	CREST
860	7976130.389	503442.612	12.145	CREST
861	7976139.918	503442.239	12.118	CREST
862	7976150.386	503442.384	12.012	CREST
863	7976160.662	503442.571	12.053	CREST
864	7976170.473	503442.564	11.917	CREST
865	7976180.65	503442.858	11.975	CREST
866	7976191.764	503443.172	11.992	CREST
867	7976201.888	503443.879	12.028	CREST
868	7976211.259	503443.55	12.106	CREST
869	7976220.723	503443.28	12.209	CREST
870	7976230.144	503442.454	12.174	CREST
871	7976240.212	503441.732	12.171	CREST
872	7976250.734	503441.667	11.932	CREST
873	7976260.417	503440.888	11.813	CREST
874	7976269.485	503439.721	11.805	CREST
875	7976273.927	503439.426	11.683	CREST
876	7976273.505	503439.205	11.675	SPOT
877	7976267.343	503439.197	11.765	SPOT
878	7976260.323	503439.822	11.851	SPOT
879	7976250.76	503440.541	11.969	SPOT
880	7976245.447	503441.453	12.019	SPOT
881	7976235.369	503441.857	12.153	SPOT
882	7976225.987	503442.588	12.178	SPOT
883	7976215.801	503443.177	12.178	SPOT
884	7976205.186	503443.262	12.002	SPOT
885	7976195.225	503443.141	11.953	SPOT
886	7976186.269	503442.597	11.936	SPOT
887	7976176.068	503442.266	11.94	SPOT
888	7976165.734	503442.192	11.922	SPOT
889	7976156.264	503442.247	12.046	SPOT
890	7976146.123	503441.926	12.05	SPOT
891	7976137.474	503442.033	12.154	SPOT
892	7976126.936	503442.283	12.079	SPOT
893	7976116.248	503442.535	12.279	SPOT
894	7976106.012	503442.007	12.217	SPOT
895	7976095.606	503441.335	11.872	SPOT
896	7976084.372	503442.002	11.624	SPOT
897	7976072.902	503441.395	11.183	SPOT
898	7976066.013	503441.056	11.187	SPOT

Point No.	Northing	Easting	Elevation	Location
899	7976053.623	503441.688	10.826	SPOT
900	7976050.135	503441.852	10.748	SPOT
901	7976048.833	503443.173	10.294	TOE
902	7976059.585	503442.561	10.474	TOE
903	7976071.562	503442.503	10.673	TOE
904	7976082.986	503443.103	11.099	TOE
905	7976093.879	503442.516	11.318	TOE
906	7976104.964	503443.073	11.56	TOE
907	7976118.351	503443.631	11.7	TOE
908	7976131.369	503443.194	11.647	TOE
909	7976145.559	503442.82	11.553	TOE
910	7976158.425	503443.33	11.52	TOE
911	7976171.166	503443.21	11.51	TOE
912	7976184.078	503443.607	11.458	TOE
913	7976196.017	503444.177	11.513	TOE
914	7976207.999	503444.016	11.67	TOE
915	7976221.069	503444.096	11.735	TOE
916	7976233.768	503442.907	11.679	TOE
917	7976246.403	503443.032	11.47	TOE
918	7976257.862	503442.365	11.304	TOE
919	7976268.068	503440.729	11.109	TOE
920	7976277.955	503439.546	10.921	TOE
921	7976280.977	503437.26	10.815	TOE
922	7976283.841	503439.476	10.979	SPOT
923	7976273.977	503443.141	11.057	SPOT
924	7976262.392	503445.597	11.253	SPOT
925	7976251.434	503446.38	11.28	SPOT
926	7976239.262	503446.62	11.431	SPOT
927	7976228.456	503446.35	11.614	SPOT
928	7976216.649	503446.342	11.584	SPOT
929	7976206.481	503446.379	11.476	SPOT
930	7976196.97	503446.18	11.54	SPOT
931	7976185.474	503446.033	11.399	SPOT
932	7976174.212	503445.995	11.42	SPOT
933	7976160.138	503445.983	11.492	SPOT
934	7976148.525	503445.906	11.536	SPOT
935	7976137.41	503446.256	11.555	SPOT
936	7976124.605	503446.095	11.516	SPOT
937	7976113.141	503445.959	11.621	SPOT
938	7976102.182	503445.311	11.438	SPOT
939	7976091.385	503445.421	11.266	SPOT
940	7976079.605	503445.546	10.92	SPOT
941	7976068.549	503445.542	10.559	SPOT
942	7976057.401	503445.715	10.291	SPOT
943	7976049.935	503445.732	10.164	SPOT
944	7976281.235	503435.865	10.837	TOE
945	7976281.344	503431.495	10.679	TOE
946	7976279.077	503428.068	10.38	TOE
947	7976271.951	503426.163	10.433	TOE
948	7976263.786	503426.06	10.713	TOE
949	7976253.828	503426.772	10.838	TOE
950	7976246.717	503426.616	10.92	TOE
951	7976237.513	503426.713	10.747	TOE

Point No.	Northing	Easting	Elevation	Location
952	7976227.433	503427.928	10.428	TOE
953	7976283.301	503434.513	10.834	SPOT
954	7976281.69	503426.714	10.455	SPOT
955	7976270.764	503424.694	10.407	SPOT
956	7976262.063	503424.168	10.599	SPOT
957	7976251.341	503424.421	10.802	SPOT
958	7976240.638	503424.716	10.799	SPOT
959	7976231.551	503425.187	10.647	SPOT
960	7976220.488	503426.195	10.514	SPOT
961	7976209.271	503427.504	10.415	SPOT
962	7976198.428	503428.405	10.288	SPOT
963	7976187.246	503429.141	10.228	SPOT
964	7976176.935	503429.303	10.285	SPOT
965	7976166.709	503429.429	10.252	SPOT
966	7976156.495	503429.285	10.326	SPOT
967	7976147.073	503429.414	10.196	SPOT
968	7976137.498	503430.029	10.14	SPOT
969	7976127.125	503430.406	10.147	SPOT
970	7976117.658	503430.921	10.116	SPOT
971	7976106.845	503430.935	10.092	SPOT
972	7976096.508	503431.02	10.068	SPOT
973	7976084.496	503431.364	9.937	SPOT
974	7976073.813	503431.929	9.952	SPOT
975	7976063.136	503431.018	9.916	SPOT
976	7976051.948	503430.742	9.951	SPOT
977	7976048.596	503427.945	9.951	SPOT
978	7976057.43	503427.395	9.943	SPOT
979	7976067.053	503426.894	9.922	SPOT
980	7976076.819	503426.312	9.968	SPOT
981	7976086.776	503425.775	9.93	SPOT
982	7976096.698	503425.652	10.065	SPOT
983	7976106.023	503425.551	10.117	SPOT
984	7976115.782	503425.314	10.113	SPOT
985	7976126.704	503425.774	10.182	SPOT
986	7976139.104	503425.39	10.203	SPOT
987	7976149.197	503425.318	10.27	SPOT
988	7976158.875	503425.374	10.28	SPOT
989	7976167.144	503425.304	10.244	SPOT
990	7976175.164	503425.257	10.293	SPOT
991	7976185.414	503424.875	10.347	SPOT
992	7976194.941	503424.481	10.339	SPOT
993	7976206.064	503424.291	10.399	SPOT
994	7976216.845	503423.559	10.455	SPOT
995	7976231.153	503422.608	10.65	SPOT
996	7976243.634	503421.47	10.845	SPOT
997	7976256.575	503421.089	10.662	SPOT
998	7976263.574	503421.149	10.43	SPOT
999	7976273.453	503421.701	10.38	SPOT
1000	7976274.948	503433.096	8.795	SPOT
1001	7976275.936	503432.66	8.867	TOE
1002	7976275.465	503431.721	8.903	TOE
1003	7976268.557	503431.715	8.809	TOE
1004	7976259.722	503432.017	8.902	TOE

Point No.	Northing	Easting	Elevation	Location
1005	7976252.58	503432.484	8.9	TOE
1006	7976242.067	503431.834	9.077	TOE
1007	7976232.437	503431.358	9.089	TOE
1008	7976223.439	503432.485	9.087	TOE
1009	7976214.172	503434.939	9.016	TOE
1010	7976210.192	503435.887	8.946	TOE
1011	7976202.116	503435.715	9.014	TOE
1012	7976193.239	503435.757	9.027	TOE
1013	7976182.161	503435.266	9.033	TOE
1014	7976173.147	503434.594	9.065	TOE
1015	7976163.58	503434.811	9.068	TOE
1016	7976156.195	503434.993	8.977	TOE
1017	7976148.066	503435.426	9.033	TOE
1018	7976140.906	503435.318	8.995	TOE
1019	7976133.137	503435.233	8.997	TOE
1020	7976122.757	503435.366	9.139	TOE
1021	7976113.542	503435.078	9.071	TOE
1022	7976103.725	503435.189	9.168	TOE
1023	7976093.933	503435.906	9.396	TOE
1024	7976085.265	503436.246	9.357	TOE
1025	7976074.113	503436.271	9.496	TOE
1026	7976064.47	503436.397	9.482	TOE
1027	7976053.861	503436.856	9.478	TOE
1028	7976046.966	503436.668	9.55	TOE
1029	7976047.315	503437.406	9.416	SPOT
1030	7976047.572	503438.427	9.551	TOE
1031	7976056.033	503438.782	9.507	TOE
1032	7976064.908	503438.023	9.54	TOE
1033	7976074.667	503437.844	9.446	TOE
1034	7976083.567	503437.825	9.451	TOE
1035	7976094.214	503436.957	9.416	TOE
1036	7976103.604	503436	9.221	TOE
1037	7976113.321	503435.936	9.061	TOE
1038	7976123.065	503436.283	9.168	TOE
1039	7976130.939	503435.911	9.093	TOE
1040	7976138.411	503436.142	9.044	TOE
1041	7976148.633	503436.308	9.032	TOE
1042	7976156.408	503436.117	9.027	TOE
1043	7976165.727	503435.803	9.065	TOE
1044	7976175.09	503435.78	9.037	TOE
1045	7976185.649	503436.492	9.007	TOE
1046	7976194.204	503436.766	8.934	TOE
1047	7976204.168	503436.957	8.942	TOE
1048	7976215.53	503436.185	8.944	TOE
1049	7976224.716	503434.398	9.028	TOE
1050	7976234.75	503433.619	9.012	TOE
1051	7976245.022	503433.553	9.025	TOE
1052	7976257.062	503433.637	8.866	TOE
1053	7976267.315	503433.183	8.82	TOE
1054	7976272.983	503433.894	8.791	TOE
1055	7976275.647	503434.69	8.908	TOE
1056	7976276.014	503434.065	8.928	TOE
1057	7976262.036	503432.865	8.741	SPOT

Point No.	Northing	Easting	Elevation	Location
1058	7976253.504	503433.167	8.772	SPOT
1059	7976244.27	503432.907	8.93	SPOT
1060	7976234.126	503432.757	8.917	SPOT
1061	7976223.858	503433.745	8.879	SPOT
1062	7976212.986	503436.044	8.836	SPOT
1063	7976202.489	503436.339	8.915	SPOT
1064	7976192.04	503436.107	9.208	SPOT
1065	7976181.98	503435.796	8.975	SPOT
1066	7976174.694	503435.249	8.954	SPOT
1067	7976166.006	503435.19	9.028	SPOT
1068	7976156.604	503435.54	9.087	SPOT
1069	7976148.2	503435.906	8.968	SPOT
1070	7976139.748	503435.789	8.951	SPOT
1071	7976129.474	503435.698	9.063	SPOT
1072	7976122.486	503435.817	9.091	SPOT
1073	7976113.167	503435.583	8.977	SPOT
1074	7976103.519	503435.772	9.172	SPOT
1075	7976093.996	503436.465	9.346	SPOT
1076	7976081.407	503437.208	9.326	SPOT
1077	7976071.127	503437.142	9.376	SPOT
1078	7976059.671	503437.995	9.472	SPOT
1079	7976049.345	503437.698	9.465	SPOT
1080	7976283.301	503415.545	9.913	SPOT
1081	7976288.368	503416.977	10.128	SPOT
1082	7976295.806	503418.707	10.242	SPOT
1083	7976302.058	503419.404	10.141	SPOT
1084	7976307.975	503420.641	10.083	SPOT
1085	7976311.039	503421.605	9.989	SPOT
1086	7976307.998	503430.017	10.232	SPOT
1087	7976301.427	503429.839	10.462	SPOT
1088	7976293.965	503429.886	10.685	SPOT
1089	7976287.59	503429.751	10.721	SPOT
1090	7976282.753	503430.097	10.695	SPOT
1091	7976281.965	503438.071	10.803	SPOT
1092	7976288.728	503438.39	11.067	SPOT
1093	7976295.702	503438.15	10.96	SPOT
1094	7976302.039	503438.586	10.8	SPOT
1095	7976304.686	503438.846	10.71	SPOT
1096	7976303.021	503446.893	10.925	SPOT
1097	7976294.695	503447.308	11.158	SPOT
1098	7976287.351	503446.844	11.19	SPOT
1099	7976279.875	503445.964	11.105	SPOT
1100	7976275.572	503445.34	11.092	SPOT
1101	7976273.415	503452.229	11.282	SPOT
1102	7976280.106	503454.842	11.342	SPOT
1103	7976286.862	503457.373	11.397	SPOT
1104	7976293.516	503460.314	11.416	SPOT
1105	7976300.05	503462.926	11.241	SPOT
1106	7976304.871	503463.711	11.083	SPOT
1107	7976309.39	503456.093	10.912	SPOT
1108	7976306.566	503454.433	11.071	SPOT
1109	7976303.836	503453.08	11.031	SPOT
1110	7976306.174	503446.515	10.887	SPOT

Point No.	Northing	Easting	Elevation	Location
1111	7976309.022	503447.168	10.862	SPOT
1112	7976313.382	503447.753	10.665	SPOT
1113	7976315.096	503439.49	10.619	SPOT
1114	7976311.692	503438.106	10.633	SPOT
1115	7976309.275	503436.919	10.619	SPOT
1116	7976311.353	503430.126	10.279	SPOT
1117	7976313.49	503430.437	10.378	SPOT
1118	7976315.655	503430.808	10.39	SPOT
1119	7976318.139	503422.244	9.962	SPOT
1120	7976316.289	503421.226	10.003	SPOT
1121	7976314.726	503420.307	9.967	SPOT
1122	7976316.81	503414.1	10.1	SPOT
1123	7976319.874	503413.847	10.15	SPOT
1124	7976323.423	503414.846	10.145	SPOT
1125	7976329.91	503428.293	11.058	CREST
1126	7976325.738	503429.916	11.156	CREST
1127	7976319.196	503430.828	11.012	CREST
1128	7976318.871	503432.066	11.066	CREST
1129	7976317.753	503435.103	11.141	CREST
1130	7976317.391	503440.431	11.321	CREST
1131	7976321.365	503441.167	10.983	CREST
1132	7976325.668	503440.595	10.688	CREST
1133	7976329.758	503440.718	10.354	CREST
1134	7976330.863	503440.593	10.347	CREST
1135	7976327.646	503441.737	10.234	TOE
1136	7976325.868	503441.308	10.355	TOE
1137	7976322.404	503441.575	10.432	TOE
1138	7976318.164	503442.553	10.527	TOE
1139	7976315.049	503443.796	10.598	TOE
1140	7976315.061	503440.742	10.612	TOE
1141	7976316.249	503434.695	10.47	TOE
1142	7976316.445	503429.527	10.391	TOE
1143	7976319.02	503428.807	10.12	TOE
1144	7976325.454	503428.163	10.266	TOE
1145	7976328.242	503427.18	10.048	TOE
1146	7976332.325	503425.747	10.426	SPOT
1147	7976321.348	503435.631	8.83	TOE
1148	7976321.719	503434.762	8.787	TOE
1149	7976326.128	503434.178	8.866	TOE
1150	7976329.26	503435.04	8.897	TOE
1151	7976330.961	503435.976	8.714	TOE
1152	7976331.168	503436.907	8.608	SPOT
1153	7976331.279	503437.416	8.643	TOE
1154	7976328.92	503437.213	8.726	TOE
1155	7976325.926	503437.882	8.745	TOE
1156	7976321.022	503437.822	8.865	TOE
1157	7976321.049	503437.035	8.834	TOE
1158	7976321.923	503436.574	8.717	SPOT
1159	7976325.107	503436.639	8.695	SPOT
1160	7976328.349	503436.613	8.681	SPOT
1161	7976324.771	503411.14	10.158	SPOT
1162	7976359.754	503403.813	10.355	CREST
1163	7976358.219	503398.592	10.002	CREST

Point No.	Northing	Easting	Elevation	Location
1164	7976358.25	503392.327	9.963	CREST
1165	7976358.396	503385.535	9.694	CREST
1166	7976357.948	503378.016	9.582	CREST
1167	7976357.433	503370.735	9.613	CREST
1168	7976357.235	503362.212	9.433	CREST
1169	7976356.718	503355.534	9.607	CREST
1170	7976356.608	503347.904	9.987	CREST
1171	7976358.912	503345.652	10.24	CREST
1172	7976361.521	503348.055	9.666	CREST
1173	7976361.58	503355.487	9.726	CREST
1174	7976362.846	503361.774	9.982	CREST
1175	7976363.077	503368.431	9.89	CREST
1176	7976363.311	503375.54	9.723	CREST
1177	7976363.877	503382.163	9.83	CREST
1178	7976364.274	503389.624	9.663	CREST
1179	7976364.164	503397.079	9.611	CREST
1180	7976364.641	503402.413	9.769	CREST
1181	7976365.031	503403.814	10.155	CREST
1182	7976366.025	503402.549	9.953	CREST
1183	7976364.918	503396.879	9.481	CREST
1184	7976365.07	503389.09	9.701	CREST
1185	7976364.162	503381.109	9.845	CREST
1186	7976364.097	503372.825	9.925	CREST
1187	7976363.668	503363.55	9.942	CREST
1188	7976363.034	503356.596	9.906	CREST
1189	7976362.258	503350.828	9.369	CREST
1190	7976361.654	503347.249	9.598	CREST
1191	7976359.702	503343.849	10.173	CREST
1192	7976360.155	503346.531	9.642	SPOT
1193	7976361.724	503350.543	9.383	SPOT
1194	7976362.195	503356.007	9.798	SPOT
1195	7976363.131	503362.743	9.959	SPOT
1196	7976363.268	503368.732	9.856	SPOT
1197	7976363.501	503375.681	9.764	SPOT
1198	7976364.036	503381.924	9.862	SPOT
1199	7976364.514	503388.57	9.635	SPOT
1200	7976364.448	503394.572	9.767	SPOT
1201	7976364.469	503398.599	9.789	SPOT
1202	7976365.313	503402.32	9.898	SPOT
1203	7976362.38	503404.434	8.896	SPOT
1204	7976361.559	503397.602	8.703	SPOT
1205	7976361.543	503390.17	8.669	SPOT
1206	7976361.049	503383.11	8.66	SPOT
1207	7976360.423	503376.395	8.636	SPOT
1208	7976360.082	503373.31	8.609	SPOT
1209	7976359.897	503367.785	8.786	SPOT
1210	7976359.387	503359.12	8.843	SPOT
1211	7976358.94	503352.225	8.924	SPOT
1212	7976358.795	503349.131	8.848	SPOT
1213	7976358.579	503348.784	8.889	TOE
1214	7976358.003	503352.731	9.039	TOE
1215	7976359.073	503360.155	8.869	TOE
1216	7976359.587	503367.47	8.834	TOE

Point No.	Northing	Easting	Elevation	Location
1217	7976359.828	503374.412	8.67	TOE
1218	7976360.428	503380.989	8.733	TOE
1219	7976361.024	503388.952	8.718	TOE
1220	7976360.92	503396.642	8.755	TOE
1221	7976361.009	503400.488	8.762	TOE
1222	7976362.095	503404.452	8.939	TOE
1223	7976362.466	503404.726	8.827	SPOT
1224	7976362.931	503404.423	8.962	TOE
1225	7976362.205	503396.799	8.722	TOE
1226	7976362.002	503388.319	8.704	TOE
1227	7976361.281	503381.014	8.693	TOE
1228	7976360.439	503373.161	8.647	TOE
1229	7976360.376	503366.548	8.877	TOE
1230	7976359.884	503359.257	8.868	TOE
1231	7976359.778	503352.472	8.98	TOE
1232	7976360.108	503349.315	8.951	TOE
1233	7976359.224	503348.352	8.904	TOE
1234	7976358.821	503344.996	10.275	CREST
1235	7976360.452	503341.895	10.211	CREST
1236	7976366.264	503338.301	9.418	CREST
1237	7976372.631	503334.169	8.159	CREST
1238	7976376.034	503331.917	7.659	CREST
1239	7976376.977	503331.976	7.157	TOE
1240	7976373.523	503336.034	7.625	TOE
1241	7976368.57	503343.405	7.564	TOE
1242	7976364.73	503351.154	7.612	TOE
1243	7976368.111	503355.838	7.849	TOE
1244	7976366.916	503365.053	7.775	TOE
1245	7976366.579	503378.332	8.51	TOE
1246	7976367.836	503387.238	8.145	TOE
1247	7976367.292	503396.065	8.466	TOE
1248	7976371.574	503394.413	8.106	SPOT
1249	7976373.204	503382.15	8.166	SPOT
1250	7976373.866	503372.664	7.867	SPOT
1251	7976372.863	503361.611	7.883	SPOT
1252	7976371.644	503350.943	7.96	SPOT
1253	7976370.888	503342.436	7.543	SPOT
1254	7976374.655	503336.376	7.498	SPOT
1255	7976377.336	503332.367	7.131	SPOT
1256	7976375.2	503331.683	7.571	TOE
1257	7976369.6	503335.234	8.447	TOE
1258	7976363.635	503338.493	9.342	TOE
1259	7976359.835	503341.538	10.224	TOE
1260	7976352.903	503345.205	10.136	SPOT
1261	7976357.231	503341.077	10.267	SPOT
1262	7976363.873	503336.342	9.301	SPOT
1263	7976371.262	503331.761	8.087	SPOT
1264	7976377.479	503328.032	7.201	SPOT
1265	7976376.046	503325.336	7.158	SPOT
1266	7976369.86	503328.928	8.032	SPOT
1267	7976363.74	503332.598	9.022	SPOT
1268	7976357.688	503336.461	10.099	SPOT
1269	7976350.381	503340.34	10.06	SPOT

Point No.	Northing	Easting	Elevation	Location
1270	7976348.337	503341.441	9.861	SPOT
1271	7976349.368	503337.391	9.966	SPOT
1272	7976354.456	503334.662	10.163	SPOT
1273	7976357.321	503333.755	10.145	SPOT
1274	7976355.896	503331.115	10.068	CREST
1275	7976359.554	503330.848	9.815	CREST
1276	7976360.577	503330.272	9.988	CREST
1277	7976360.688	503322.867	10.221	CREST
1278	7976360.238	503313.394	10.039	CREST
1279	7976360	503302.88	10.121	CREST
1280	7976358.987	503294.816	9.713	CREST
1281	7976358.227	503286.69	9.839	CREST
1282	7976357.953	503279.638	10.528	CREST
1283	7976357.701	503271.68	10.448	CREST
1284	7976357.995	503263.449	10.378	CREST
1285	7976357.658	503258.167	10.272	CREST
1286	7976358.934	503258.151	10.204	CREST
1287	7976358.68	503265.951	10.431	CREST
1288	7976358.631	503273.511	10.495	CREST
1289	7976358.69	503279.824	10.425	CREST
1290	7976359.232	503285.025	10.037	CREST
1291	7976359.924	503291.625	9.685	CREST
1292	7976360.297	503296.972	9.684	CREST
1293	7976362.468	503301.11	9.988	CREST
1294	7976362.507	503309.184	10.077	CREST
1295	7976362.208	503317.475	10.017	CREST
1296	7976361.762	503323.507	10.203	CREST
1297	7976361.37	503330.301	9.943	CREST
1298	7976360.948	503331.16	9.8	CREST
1300	7976360.95	503330.297	9.967	SPOT
1301	7976361.236	503323.347	10.215	SPOT
1302	7976361.205	503316.781	10.08	SPOT
1303	7976361.255	503310.051	10.027	SPOT
1304	7976360.808	503302.497	9.985	SPOT
1305	7976359.43	503294.566	9.67	SPOT
1306	7976358.874	503287.661	9.766	SPOT
1307	7976358.354	503281.044	10.485	SPOT
1308	7976357.967	503274.216	10.511	SPOT
1309	7976358.186	503265.977	10.471	SPOT
1310	7976358.25	503258.717	10.31	SPOT
1311	7976360.013	503259.128	9.734	TOE
1312	7976360.018	503265.824	9.794	TOE
1313	7976359.448	503276.824	9.939	TOE
1314	7976359.886	503281.424	9.893	TOE
1315	7976360.995	503286.141	8.885	TOE
1316	7976362.084	503296.126	8.511	TOE
1317	7976367.998	503296.138	6.228	TOE
1318	7976373.02	503301.005	5.823	TOE
1319	7976374.317	503308.159	6.13	TOE
1320	7976371.347	503315.422	6.437	TOE
1321	7976371.014	503317.695	6.569	TOE
1322	7976371.763	503323.606	6.717	TOE
1323	7976373.791	503323.981	7.276	CREST

Point No.	Northing	Easting	Elevation	Location
1324	7976368.85	503327.553	8.01	CREST
1325	7976364.312	503331.049	8.927	CREST
1326	7976360.692	503333.059	9.549	CREST
1327	7976358.491	503329.73	9.139	TOE
1328	7976358.194	503318.809	9.175	TOE
1329	7976357.943	503310.239	9.061	TOE
1330	7976357.684	503300.608	9.034	TOE
1331	7976357.276	503291.598	9.187	TOE
1332	7976356.947	503284.364	9.469	TOE
1333	7976356.691	503276.338	9.914	TOE
1334	7976356.305	503267.034	9.79	TOE
1335	7976356.647	503258.848	9.836	TOE
1336	7976355.212	503260.054	9.761	SPOT
1337	7976354.334	503267.754	9.857	SPOT
1338	7976354.671	503276.424	9.879	SPOT
1339	7976355.188	503278.608	9.902	SPOT
1340	7976356.329	503285.944	9.41	SPOT
1341	7976356.955	503293.607	9.129	SPOT
1342	7976357.173	503300.973	9.007	SPOT
1343	7976357.277	503307.065	9.02	SPOT
1344	7976357.513	503314.103	9.083	SPOT
1345	7976357.653	503321.328	9.172	SPOT
1346	7976357.894	503328.292	9.075	SPOT
1347	7976358.068	503329.582	9.041	SPOT
1348	7976357.4	503329.617	9.082	TOE
1349	7976357.19	503322.665	9.216	TOE
1350	7976357.067	503313.101	9.084	TOE
1351	7976356.825	503304.521	9.102	TOE
1352	7976356.508	503295.567	9.1	TOE
1353	7976356.091	503288.141	9.25	TOE
1354	7976355.637	503285.585	9.464	TOE
1355	7976355.107	503279.789	9.964	CREST
1356	7976354.512	503288.915	9.604	CREST
1357	7976354.05	503298.001	9.709	CREST
1358	7976354.484	503307.51	9.782	CREST
1359	7976354.632	503316.437	9.759	CREST
1360	7976354.809	503325.387	9.745	CREST
1361	7976354.533	503331.057	9.773	CREST
1362	7976352.012	503322.84	9.779	SPOT
1363	7976351.663	503314.541	9.676	SPOT
1364	7976350.826	503304.283	9.729	SPOT
1365	7976349.828	503294.573	9.66	SPOT
1366	7976350.027	503283.993	9.726	SPOT
1367	7976345.52	503285.225	9.74	SPOT
1368	7976344.946	503296.26	9.632	SPOT
1369	7976343.759	503305.867	9.722	SPOT
1370	7976343.279	503316.705	9.82	SPOT
1371	7976343.804	503326.899	9.734	SPOT
1372	7976346.235	503335.849	9.817	SPOT
1373	7976348.543	503344.749	10.014	SPOT
1374	7976349.338	503351.094	9.934	SPOT
1375	7976350.023	503359.435	9.726	SPOT
1376	7976351.678	503366.438	9.292	SPOT

Point No.	Northing	Easting	Elevation	Location
1377	7976351.134	503375.409	9.589	SPOT
1378	7976351.22	503384.809	9.779	SPOT
1379	7976350.163	503394.726	9.848	SPOT

MLN_CLVRT

Point No.	Northing	Easting	Elevation	Location
610	7976358	503330.1	9.084	CULVERT
611	7976359	503348.1	8.949	CULVERT
612	7976276	503433.2	8.803	CULVERT
613	7976321	503436.3	8.728	CULVERT

Baffinland HATCH

Project Memo

H349002

2016-09-30

To:	**Baffinland** Jim Millard	From:	**Hatch** Matthew Buykx
cc:	Wayne McPhee		James Cleland

Baffinland Iron Mines Corporation

Mine Site Crusher Pad Drainage

As requested, Hatch has revised the Mine Site Ore Crushing & Screening Earthworks & Drainage – Plan drawing (Drawing Number H349000-4133-10-035-0001) to As-Built status. This revised drawing now shows the drainage ditches and swales constructed by Baffinland Iron Mines (BIM). The drawing revision is based on survey data and photos provided by BIM.

Matthew Buykx, P. Eng

MB:jfw

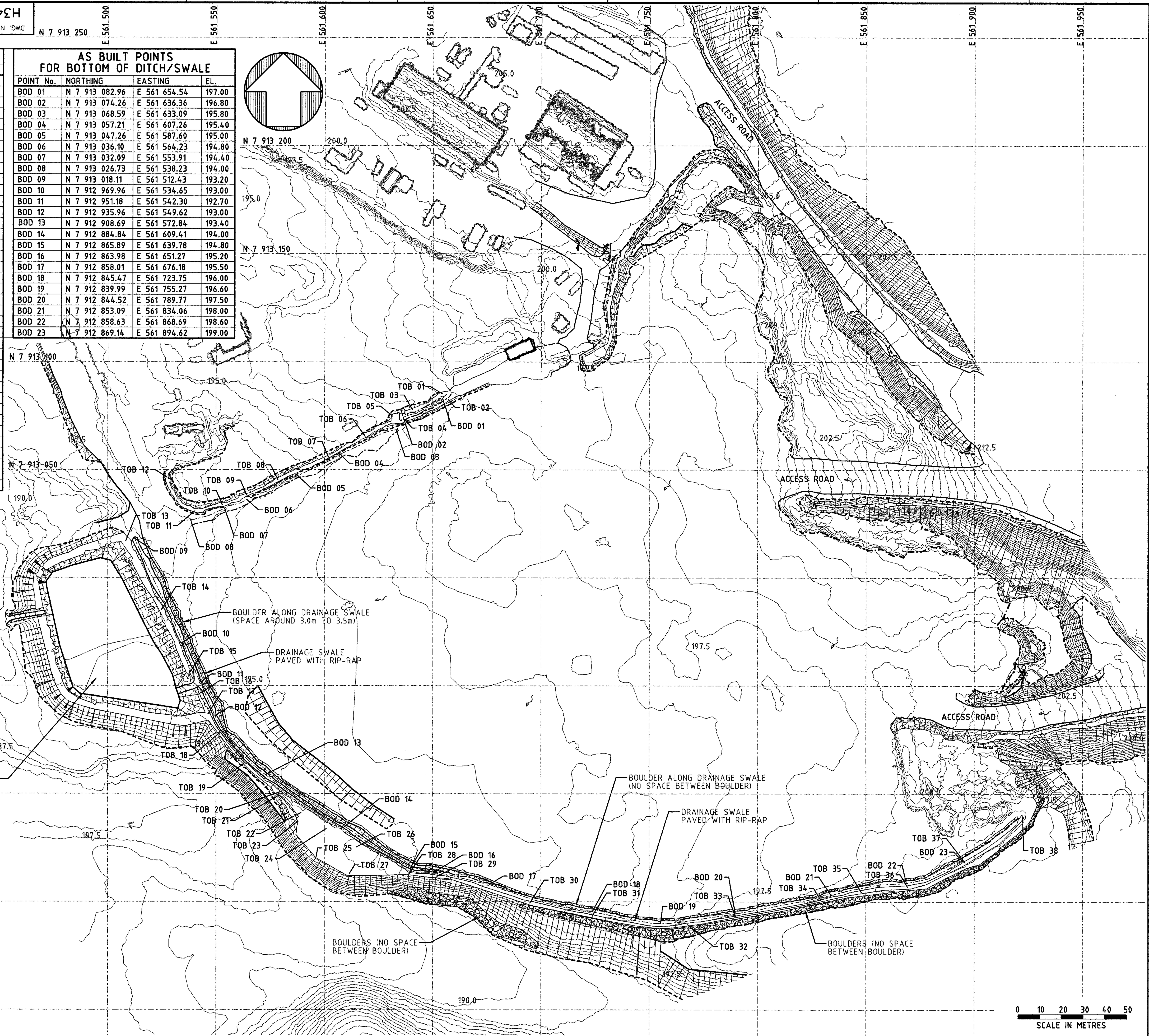
REGISTERED PROFESSIONAL ENGINEER
M. J. BUYKX
LICENSEE
30/9/16
NT/NU

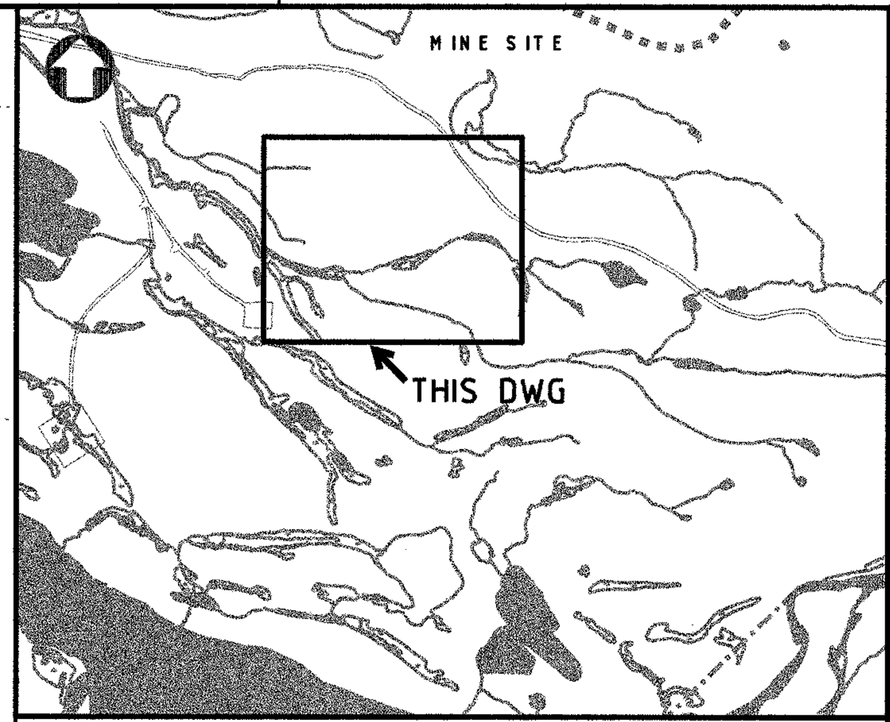
H349000-4133-10-035-0001

DWG. NO.

AS BUILT POINTS FOR TOP OF BERM			
POINT No.	NORTHING	EASTING	EL.
TOB 01	N 7 913 085.20	E 561 654.41	197.20
TOB 02	N 7 913 082.48	E 561 657.25	197.40
TOB 03	N 7 913 077.88	E 561 640.55	197.00
TOB 04	N 7 913 072.90	E 561 637.37	197.00
TOB 05	N 7 913 074.80	E 561 631.48	196.80
TOB 06	N 7 913 065.49	E 561 618.75	196.00
TOB 07	N 7 913 055.90	E 561 601.80	195.50
TOB 08	N 7 913 045.37	E 561 578.49	195.20
TOB 09	N 7 913 038.21	E 561 564.12	195.00
TOB 10	N 7 913 033.77	E 561 552.83	194.60
TOB 11	N 7 913 030.84	E 561 540.21	194.60
TOB 12	N 7 913 046.43	E 561 527.33	194.40
TOB 13	N 7 913 017.07	E 561 508.33	193.40
TOB 14	N 7 912 985.10	E 561 524.80	193.60
TOB 15	N 7 912 955.37	E 561 537.50	193.40
TOB 16	N 7 912 945.95	E 561 542.02	193.40
TOB 17	N 7 912 936.70	E 561 546.17	193.30
TOB 18	N 7 912 928.00	E 561 551.58	193.60
TOB 19	N 7 912 913.88	E 561 562.86	193.80
TOB 20	N 7 912 900.80	E 561 579.65	194.40
TOB 21	N 7 912 899.06	E 561 578.83	194.60
TOB 22	N 7 912 891.12	E 561 589.18	194.60
TOB 23	N 7 912 886.91	E 561 587.60	194.80
TOB 24	N 7 912 883.79	E 561 600.83	194.80
TOB 25	N 7 912 870.83	E 561 596.22	194.65
TOB 26	N 7 912 875.35	E 561 614.84	195.20
TOB 27	N 7 912 862.90	E 561 611.48	194.80
TOB 28	N 7 912 862.82	E 561 639.11	195.80
TOB 29	N 7 912 861.77	E 561 651.96	195.80
TOB 30	N 7 912 849.44	E 561 694.86	196.00
TOB 31	N 7 912 843.49	E 561 723.75	196.40
TOB 32	N 7 912 839.49	E 561 767.61	197.20
TOB 33	N 7 912 843.16	E 561 789.89	197.80
TOB 34	N 7 912 850.54	E 561 829.38	198.20
TOB 35	N 7 912 854.41	E 561 847.95	198.40
TOB 36	N 7 912 856.76	E 561 869.35	198.80
TOB 37	N 7 912 868.25	E 561 895.78	199.20
TOB 38	N 7 912 889.37	E 561 922.33	199.40

AS BUILT POINTS FOR BOTTOM OF DITCH/SWALE			
POINT No.	NORTHING	EASTING	EL.
BOD 01	N 7 913 082.96	E 561 654.54	197.00
BOD 02	N 7 913 074.26	E 561 636.36	196.80
BOD 03	N 7 913 068.59	E 561 633.09	195.80
BOD 04	N 7 913 057.21	E 561 607.26	195.40
BOD 05	N 7 913 047.26	E 561 587.60	195.00
BOD 06	N 7 913 036.10	E 561 564.23	194.80
BOD 07	N 7 913 032.09	E 561 553.91	194.40
BOD 08	N 7 913 026.73	E 561 538.23	194.00
BOD 09	N 7 913 018.11	E 561 512.43	193.20
BOD 10	N 7 912 969.96	E 561 534.65	193.00
BOD 11	N 7 912 951.18	E 561 542.30	192.70
BOD 12	N 7 912 935.96	E 561 549.62	193.00
BOD 13	N 7 912 908.69	E 561 572.84	193.40
BOD 14	N 7 912 884.84	E 561 609.41	194.00
BOD 15	N 7 912 865.89	E 561 639.78	194.80
BOD 16	N 7 912 863.98	E 561 651.27	195.20
BOD 17	N 7 912 858.01	E 561 676.18	195.50
BOD 18	N 7 912 845.47	E 561 723.75	196.00
BOD 19	N 7 912 839.99	E 561 755.27	196.60
BOD 20	N 7 912 844.52	E 561 789.77	197.50
BOD 21	N 7 912 853.09	E 561 834.06	198.00
BOD 22	N 7 912 858.63	E 561 868.69	198.60
BOD 23	N 7 912 869.14	E 561 894.62	199.00





KEY PLAN

LEGEND:

204	AS BUILT GROUND CONTOURS
	FILL SLOPE
	CUT SLOPE
	TOE OF SLOPE
	CENTERLINE OF DITCH
	FLOW DIRECTION
	SLOPE BREAKLINE
01	AS BUILT POINT NUMBER
BOD	BOTTOM OF DITCH/SWALE
TOB	TOP OF BERM

NOTES:

1. AS BUILT SURVEY DATA PROVIDED BY BAFFINLAND.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 0.5m.
4. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METRES UNLESS NOTED OTHERWISE.

1 AS BUILT

H349000-4000-00-014-0003	MINE SITE – INFRASTRUCTURE LAYOUT	
DRAWING NO.	DRAWING TITLE	

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS BUILT INFOMATION ADDED	AW	MB	MB	2016-09-30

REVISIONS

REV.	ISSUE FOR	AUTH.	BY	DATE
1	AS BUILT	AW	MB	2016-09-30
0	CONSTRUCTION	SH	MM	2013-08-29

ISSUE AUTHORIZATION

HATCH

DESIGNED BY M. MCDOUGALD DATE 2013-05-28	DRAWN BY M. MCDOUGALD DATE 2013-05-28
CHECKED BY A. MOHEBKHANI DATE 2013-08-29	DISCIP. ENGR. S. HASSAN DATE 2013-08-29
PROJ. DES. COORD. T. THERTELL DATE 2013-08-29	PROJ. ENGR. J. CLELAND DATE 2013-08-29
PROJ. MGR. S. PERRY DATE 2013-08-29	

Baffinland

MARY RIVER PROJECT

MINE SITE
ORE CRUSHING & SCREENING
EARTHWORKS & DRAINAGE – PLAN

SCALE	DWG. NO.	REV.
1:1000 OR AS NOTED	H349000-4133-10-035-0001	1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

$USERNAME$ $DATE$ $FILE$ $TIME$

APPENDIX C.2

2016 GEOTECHNICAL INSPECTIONS

BHM Project No. 16-094

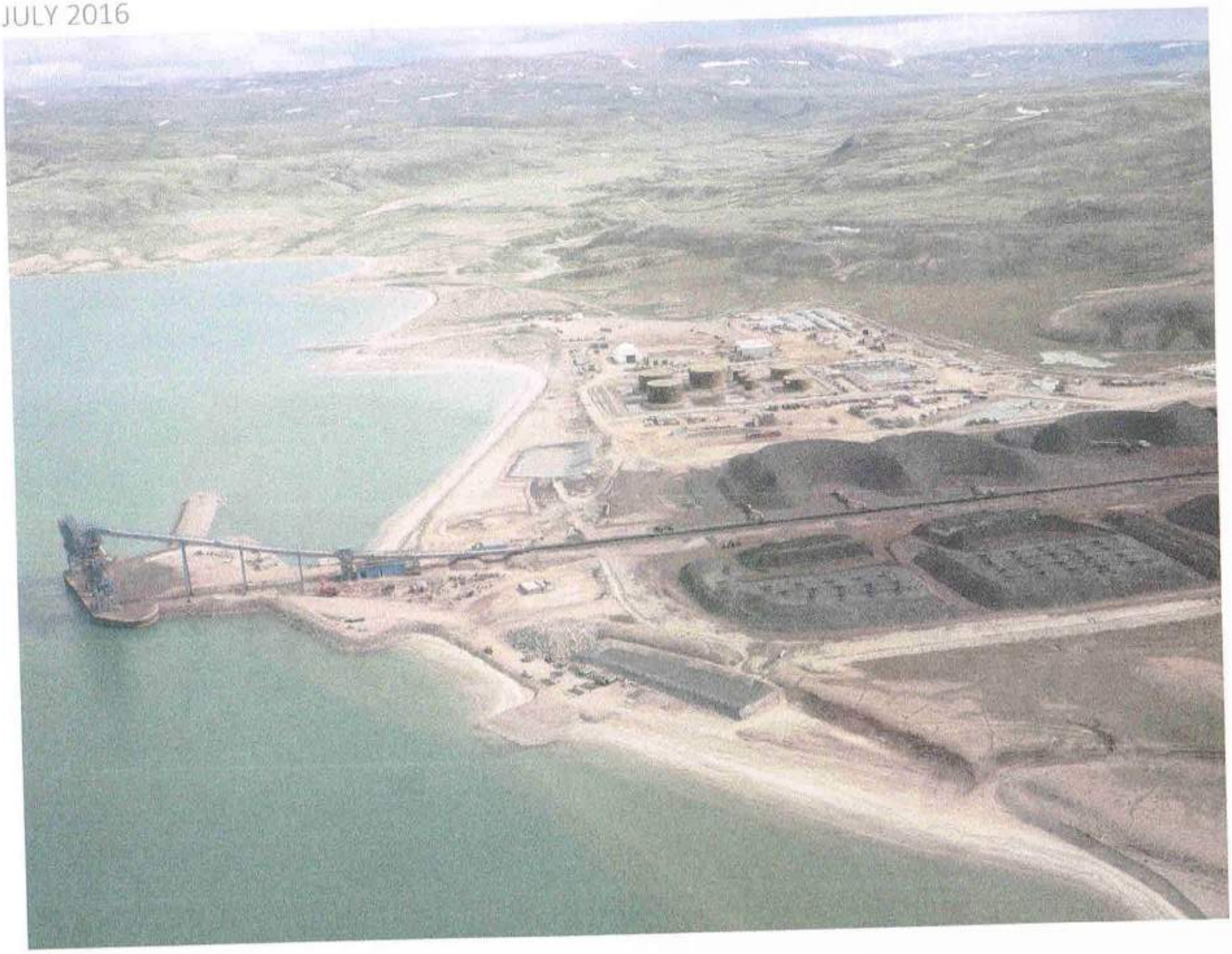
BAFFINLAND IRON MINES CORPORATION

ANNUAL GEOTECHNICAL INSPECTIONS

MARY RIVER PROJECT

INITIAL INSPECTION OF TWO

JULY 2016



Prepared for:

Mr. Jeff Bush
Site Services Superintendent
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

BARRY H. MARTIN

Barry H. Martin, P. Eng., MRAIC, Consulting Engineer and Architect
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Timmins, Ontario
Tel. 705-268-5621
barrymartin1499@gmail.com

INDEX

July 31, 2016

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

Attention: Jeff Bush
jeff.bush@baffinland.com

RE: ANNUAL GEOTECHNICAL INSPECTIONS
BAFFINLAND IRON MINES CORPORATION
OUR REFERENCE NO. 16-094

1.0 INTRODUCTION

Barry H. Martin, P. Eng., Consulting Engineer, completed the eighth annual water licence geotechnical inspection of the following on-site engineered facilities as required by Licence No. 2AM-MRY 1325 of the Nunavut Water Board:

Pit Walls
Quarries
Landfills
Land Farms
Bulk Fuel Storage Facilities
Sediment Ponds
Collection Ponds
Polishing and Waste Stabilization Ponds

The inspection that took place July 28th to July 30th, 2016 is the first phase of a biannual inspection to be carried out within the open water shipping season at the two Baffinland sites, in Mary River at the mine site, and at Milne Inlet at the port facility.

The inspections were carried out in accordance with the guidelines set out in "Dam Safety Guidelines 2007" as published by the Canadian Dam Association.

The inspections were completed by Mr. Barry H. Martin, P. Eng., the design Engineer for the initial containment facilities both at Mary River and Milne Inlet, the runaway extension, initial bridges on the connecting road, the solid waste disposal site as well as continuing construction of select mine infrastructure.

The eight previous annual water licence geotechnical inspections were completed by Mr. Martin. You shall note that Hazardous Waste Containment Structures have been assigned designations in the report that were established by the Environmental group in past years.

The facilities inspected are as per the following:

Mary River Site

Bulk Fuel Storage Containment
Generator Fuel Storage Facility Containment
Polishing/Waste Stabilization Pond No. 1
Polishing/Waste Stabilization Ponds Nos. 2 and 3 (constructed as a two-cell structure)
Helicopter Fuel Cell Containment
Barrel Fuel Containment (constructed as a two-cell structure) (MS-HWB-3 and MS-HWB-4)
Hazardous Waste Storage (MS-HWB-2)
Enviro-Tank Storage (constructed contiguous with hazardous waste storage and stove oil storage) (MS-HWB-1)
Stove Oil Storage (MS-HWB-5)
Solid Waste Disposal Site
Minesite Steel Fuel Tank Farm Containment
Quarry
Crusher Pad Drainage Containment
Waste Pile Drainage Containment
Jet "A" Aircraft Containment
Hazardous Waste Containment (MS-HWB-6)

A site plan for the Mary River site showing most structures reviewed is attached.

Milne Inlet Site

Hazardous Waste Storage (constructed as a two-cell structure) (MP-HWB-3 and MP-HWB-4)
Fuel Tank Farm
New Sewage Effluent Pond (PWSP)
Land Farm
Contaminated Snow Containment
Sediment Ponds East and West
Quarry
Loading Area Contaminated Storage (MP-HWB-1)
Fuelling Facility Containment

A site plan for the Milne Inlet site showing most structures reviewed is attached.

2.0 METHODOLOGY FOR INSPECTION

The geotechnical inspector was Barry H. Martin, P. Eng., who reviewed the two sites for the first of the biannual inspections on July 28th, 2016 to July 30th, 2016 just as the annual shipping season commenced with the arrival of the first ship into port. There is a further inspection planned to take place at the end of the shipping season at the end of September / beginning of October.

The inspections primarily focused on the following aspects:

1. The structures were inspected for conformance with the design basis as presented in "as-constructed" and "as-built" drawings (provided in the first and subsequent reports).

2. The structures were specifically inspected for settlement, cracking, and seepage through the berms.

3. The areas around the structures were examined for evidence of seepage.

4. Quarry walls were reviewed for relative stability. I note that the quarries were active removal areas and long term stability was not yet established.

5. New structures recently constructed were reviewed for conformity with design drawings.

6. Photographs were taken to document observations made during the inspection and are attached.

3.0 MARY RIVER CAMP

3.01 General

As with other years, there had been some rainfall at Mary River preceding this first inspection and it was expected that there would be some water in the containment dykes.

A monitoring program is in place to test storm water that does accumulate within the containment structures. As reviewed, the water that does not meet the water licence effluent requirements is treated on site prior to release. In some cases, water collected within the structures has been pumped out.

At the Bulk Fuel Storage Facility Containment, the water that collects within the dyke is treated at the end of the containment structure.

As with the report last year there are some new code names assigned to the containment structures.

The Bulk Fuel Storage Containment (Exploration Phase Bladder Farm) is coming due for decommissioning and is currently used to store barrels of fuel, lubricant cubes, and a large fuel tank.

3.02 Bulk Fuel Storage Facility (Exploration Phase Bladder Farm)

General Conditions

The Bulk Fuel Storage Facility still exists but it is no longer utilized as a bulk fuel storage facility. There are a number of full fuel barrels now stored within the berms, as well as a large fuel tank.

The granular cover over the geotextile and liner is still in place within the containment structure and is awaiting land farming and a fair amount of water at one end awaiting treatment is contained within the dykes.

Stability

At the time of this review, water had not been removed for a period from within the containment and water was ponding above the level of the gravel within the bottom of the containment at the north end of the facility.

At the load-out end of the facility there was minor water ponding within the dykes.

The soil structure is considered stable in the present condition and is in conformance with the design basis for the facility.

The presence of water within the structure and at the load-out area is an indication of the integrity of the liner.

The dykes have been built up recently to reinforce the concept of no loader travel over the dykes.

Recommendations

We have no recommendations with respect to this containment structure as it awaits decommissioning other than to note that it may make an ideal land farm.

3.03 Generator Fuel Storage Containment (Exploration Phase)

This particular containment structure is currently being decommissioned. The fuel bladder that was contained within the dyke had been removed prior to our second inspection in 2015.

The granular fill over the geotextile and liner shall require landfarming with the material from the bulk fuel storage facility.

There is no indication that the liner is compromised and decommissioning should proceed when the granular cover is either moved to a land farm or other containment. There is water ponding within the structure.

3.04 Polishing/Waste Stabilization Pond #1

General Conditions

PWSP No. 1 continues to be utilized as a holding facility for sewage plant effluent that does not meet water effluent quality criteria.

Currently the pond is being used primarily as a repository for off spec sewage and sewage sludge forming in lift stations.

The supernatant from PWSP No. 1 is periodically decanted to PWSPs Nos. 2 and 3 where it is tested and treated as required to meet Water Licence effluent requirements.

At the time of our visit there was less than fifty percent of capacity in use and the structure readily conforms to its design intent.

Stability

Our review of this area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing sewage and there are no tears or ruptures in the membrane, excepting some minor tears from past activity at the top of the dyke well above the allowable effluent level in the structure, in the horizontal portion of the membrane.

A review of the top of the dyke showed no indication of cracking or settlement which would indicate stresses within the structure.

Many of the tears that had occurred in the liner on the top of the dyke have been patched during the period between reviews in 2008 and 2009 and are holding well. As well, there are no signs of weather related deterioration of the liner where it is exposed.

There appears to be no sign of erosion of the dykes, even with the precipitation that has occurred over the lifetime of the facility.

The minor settlements that have taken place have had little effect on the integrity of the structure.

Recommendations

We have no recommendations with respect to this containment facility.

3.05 Polishing Ponds/Waste Stabilization Ponds #2 and #3

General Conditions

The structure was designed and constructed as a two-cell structure.

The supernatant from PWSP #1 is currently discharged to PWSPs Nos. 2 and 3. The treated effluent is tested for Water Licence effluent requirements, treated if necessary, and discharged to the environment.

At the time of our visit there was considerable freeboard to accommodate further sewage and the structure readily conforms to its design intent. Both cells were almost empty and contained less than 1' of liquid which was the capacity allowed for sludge in the design.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing the sewage and there are no tears or ruptures in the membrane.

Longitudinal cracking which appeared in the dykes of PWSP #3 due to the melt of permafrost wedges in 2009 has not reoccurred and we consider this structure to be stable in its present condition.

Monitoring points have been set upon the top of the dyke and have been monitored since 2009. Settlements have occurred since that time. These settlements have not led any stress cracks in the structure. Monitoring has been discontinued.

There appears to be no sign of erosion of the dykes and plants are continuing to seed themselves on the dykes. This growth is minimal, but increasing.

There are small bubbles formed by air trapped under the enviroliner that were present in the first review that are probably the result of wrinkles in the liner that should disappear if further liquid is added to the cell.

Recommendations

We have no recommendations with respect to this containment facility.

3.06 Helicopter Fuel Tank Containment

General Conditions

The structure was designed and constructed as a single cell structure that contains a 1000 gal fuel storage tank.

The structure currently conforms to its design intent.

In the past, a liner clad wood curb had been added to the top of the berm to prevent the erosion of gravel off the berm, caused by pulling the fuel hose from within the dyke out to the helicopters to provide them with fuel.

As it is the intent of the mine to use fuel that is available in barrels, a temporary cell has been constructed to contain the barrels with a one piece liner and wood timbers.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage. There is wet sand in the bottom of the containment indicating the integrity of the liner.

A review of the exterior and the top of the berms showed no sign of cracking or settlement which would indicate stress within the structure.

The structure is considered to be stable in its present condition.

Recommendations

We have no recommendations with respect to this structure. It is assumed the temporary containment shall be removed when the barrel fuel has been utilized.

3.07 Barrel Fuel Containment (MS-HWB-3 and MS-HWB-4)

General Conditions

This particular structure which we called "Barrel Fuel Containment" in our previous inspection reports is a two-cell structure which is currently used to accommodate cubes of lubricant and barrels in the east cell and cubes of lubricant and antifreeze in the west cell.

Stability

Our review of the area around this containment structure showed no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and top of the dyke showed no sign of cracking or settlement which would indicate stresses within the structure.

The structure is considered to be stable in its present condition.

As with the Bulk Fuel Storage Containment, the dykes have been built up to discourage any possible travel over these dykes.

Recommendations

We have no recommendations at this time.

3.08 Hazardous Waste Storage (MS-HWB-2)

General Conditions

This particular cell was constructed contiguous with an existing cell, which is referred to on site as the "Enviro Tank Storage", from drawings by our office in 2010 and conforms to our drawings. It is also contiguous with the Stove Oil Storage cell.

This structure contains barrels and bags of hazardous waste.

Stability

Our review of the area around this cell at the base of the slopes, showed no sign of seepage. There is water ponding in this structure.

The structure appears to be stable in its present condition. The water confirms the integrity of the liner.

Recommendations

There are no recommendations at this time.

3.09 Enviro Tank Storage (MS-HWB-1)

General Conditions

This particular structure is constructed contiguous with the Hazardous Waste Storage constructed in 2010 and the Stove Oil Storage cell. It was utilized as a wash down cell during the past seasons. It is currently not being used and access is blocked.

Stability

In 2014 there was concern for the integrity of this cell as the cell was dry and the geotextile was exposed from heavy traffic during our initial inspection. During our second inspection, the cell was holding a small amount of water confirming limited integrity of the liner.

The cell is dry this year raising concerns anew on the integrity of the liner. We concur with the fact that use of this cell has been abandoned and the cover in the cell awaits landfarming.

Recommendations

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell or that this cell be permanently decommissioned.

3.10 Stove Oil Storage (now MS-HWB-5)

General Conditions

This particular structure had been used to store barrels of stove fuel in past years and is still utilized for this purpose of storing barrel fuel.

Currently, access to this cell has been blocked with granular fill.

This structure was constructed in accordance with a standardized drawing provided by this office utilizing a one piece liner.

Stability

Our review of the exterior and the top of the dyke showed no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and the top of the dyke showed no sign of cracking or settlement which would indicate stresses with the structure.

There is water contained within the cell confirming the integrity of the liner.

The structure is considered to be stable in its present condition.

3.11 Solid Waste Disposal Site

The solid waste disposal site is currently entering the second phase of its construction. The first lift of solid waste has been placed and covered fully and appears to be doing exactly what it was proposed to do at the design stage.

Work is currently being done on building a berm on three sides of the disposal side at a level above the existing lift in advance of placing another lift. The berm is being constructed as per the berm on the first level that served us well over the past several years.

The blow fence has not been reinstalled yet. In the meantime, solid waste has been covered as it is installed and may be continued to be done in this manner to control "blow".

We are most pleased with what we saw at this site.

3.12 Minesite Steel Fuel Tank Farm Containment

General Conditions

All work appears to be complete excepting the installation of the sump pits that are on site awaiting installation and which shall be utilized to facilitate the removal of water that collects from precipitation.

There is water ponding in the bottom of the containment confirming the integrity of the liner. This ponding of water is now above the cover on the bottom of the containment.

Stability

All work appears to have been completed in accordance with drawings and we have no concerns with the stability of this containment structure.

Recommendations

We recommend that at least one sump be installed as per the drawings prepared for this facility and that when weather permits, removal of water within the containment.

3.14 Quarry QMR2

General Conditions

The quarry has well defined benches. The quarry faces at the benches appear clean.

The quarry is inactive at this time but definitely not closed.

The area where the road was undermined in September 2015 has undergone further quarrying and the access road is gone This area is a fractured zone and subject to subsidence as we noted while on site.

Stability

Care must be taken while quarrying in the unstable fractured zone.

3.14 Crusher Pad Drainage Containment

General Conditions

There is a new containment constructed to catch surface water flow from the crushing area and stockpile area at the minesite. The catchment ditches that had not been quite completed beyond the pond at the time of our last inspection, have now been completed for the entire pad.

Stability

The structure has been completed in accordance with drawings included in our earlier report in a most satisfactory manner.

Recommendations

We have no recommendations with respect to this containment structure.

3.15 Waste Stockpile Drainage Containment

Stability

The dyke appears stable at this time.

This particular structure has now been completed and is as shown on the aerial photograph for this structure. The structure is in place and only minor trimming is required at the inlet side. The outfall hose to pump the supernatant water over to the Mary River watershed is under construction with the pump in place on the dyke.

It is currently working as per the design intent.

3.16 Jet "A" Fuel Containment and Pump

This cell was constructed to replace the containment structure near the Weatherhaven Camp.

This cell now contains two double walled tanks and is located north of the air terminal buildings.

Stability

The cell was constructed using a one piece enviroliner and geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There were no signs of cracking of the dykes. A granular ramp has been constructed over the dyke to facilitate access for snow removal. There was water ponding in the cell at the time of our inspection indicating the integrity of the liner.

Recommendations

We have no recommendations at this time.

3.17 Hazardous Waste Containment (MS-HW-6)

General Conditions

Although it was constructed in 2012, we first reported on it in 2015.

It is located near the incinerator and is utilized to store barrels of ash from the incinerator and other hazardous waste.

Stability

The cell was constructed utilizing a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the bottom of the cell confirming the integrity of the liner.

There were no signs of cracking of the dykes or seepage around the exterior of the dykes.

Recommendations

The liner at the back of the cell on the dyke has been torn while placing a pallet supporting hazardous waste into the cell. This torn liner should be repaired.

3.18 Overview

This report is the eighth annual Geotechnical Inspection at Mary River and Milne Inlet completed by this author on behalf of Baffinland Iron Mines Corporation and the second year of reporting covering the first of two inspections in one shipping season.

As set out in our past reports, there has been little or no erosion taken place from wind or rain and the dykes constructed of the sand/gravel soil have remained stable at slopes of 3:1 and 4:1.

As noted two years ago, there are only just now signs of settlement appearing at PWSP's 1, 2 and 3. The settlements are not differential settlements of the dykes but are minor overall settlements of the total structures with respect to the surrounding area.

These settlements appear to be settlements within the one metre ± active layer above the permafrost and are of little concern as the PWSP's are temporary structures and the settlements have no effect on the dyke stability.

It is expected that many of the structures that form the basis for the inspections set out in the biannual Geotechnical inspections shall be decommissioned as the mine facilities are finalized.

A number of these structures are awaiting the construction of a land farm to facilitate the disposal of contaminated granular fill from the bottom of containment cells.

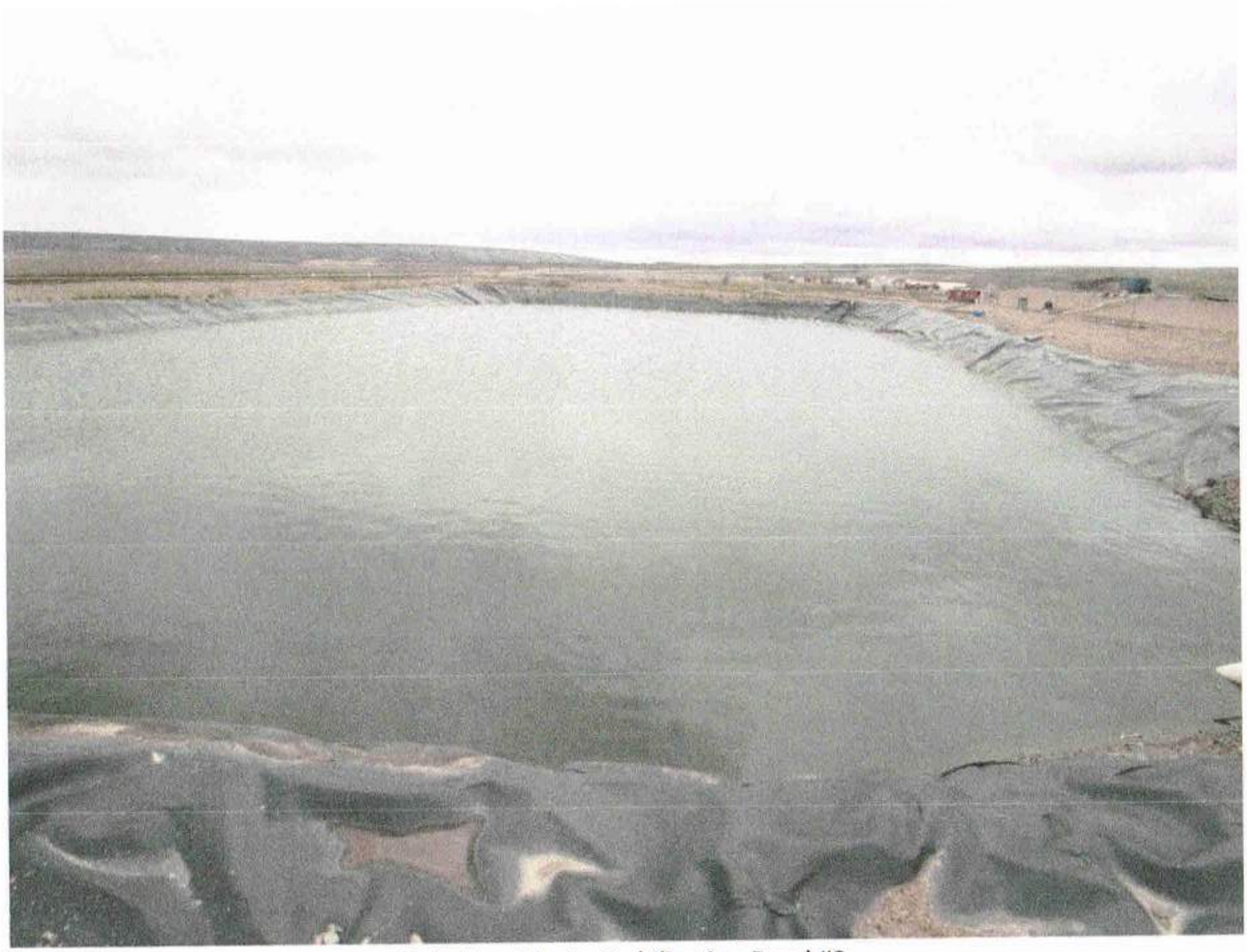
Mary River Photos

Bulk Fuel Storage Facility

Generator Fuel Storage Facility. Containment now empty.

Polishing Waste Stabilization Pond #1

Polishing Waste Stabilization Pond #2.



Polishing Waste Stabilization Pond #3.

Barrel Fuel Containment MS-HWB-3

Barrel Fuel Containment MS-HWB-4

Hazardous Waste Storage MS-HWB-4

Enviro Tank Storage MS-HWB-5

Stove Oil Storage MS-HWB-1

Solid Waste Disposal Site. Dyke to contain waste on edge of second lift.

Minesite Steel Fuel Tank Containment. Sumps awaiting installation.

Minesite Steel Fuel Tank Containment

Quarry

Crusher Pad Drainage Containment

Waste Pile Drainage Containment

Jet "A" Fuel Containment

Hazardous Waste Containment MS-HWB-6

Aerial Photograph Waste Pile Drainage Containment

4.0 MILNE INLET

4.01 General

There are still changes taking place at Milne Inlet, since our last inspection in September of last year.

The sediment ponds at the shore that were under construction last season are now operational.

Since our last review, all facilities are fully functional except for minor shortcomings.

4.02 Hazardous Waste Storage (MP-HWB-3 and MP-HWB-4)

General Conditions

This particular structure has been constructed as a two-cell structure and is now only used to store a few items.

A new hazardous waste storage facility has now been constructed near the loadout area for storing hazardous waste to be shipped out and is in full operation at this time.

Stability

There is no water ponding in both cells of the original structure. We are advised that water has been pumped from these structures and sand in the structures is wet.

Our review of the area around the dykes, at the base of the slopes, showed no sign of seepage. The structure is considered stable.

Recommendations

We have no recommendations with respect to the use of these two cells at this time. Prior to our inspection in September, we request that water not be pumped from the structures.

4.03 Fuel Tank Farm

General Conditions

Since both 2012 and 2013 the fuel tank farm has been expanded considerably with the addition of a number of new tanks. No tanks have been added since last season but there is room to place additional tanks.

We note that the sump placed in the containment is still located at the high end of the containment. There is water ponding in the low end of the containment.

Stability

We have minor water ponding at the low end of the containment confirming the integrity of the liner.

Recommendations

We recommend that a sump be considered at to the low point at the north end of the containment, to better facilitate the removal of water to minimize the treatment of water should a minor spill occur within the containment.

4.04 New Effluent Pond (PWSP)

General Conditions

The pond was put into operation in 2014.

The containment pond was operating at approximately sixty-percent of capacity at the time of our inspection.

Stability

We noted no sign of weakness in any of the construction.

Recommendations

We have no recommendations with respect to the use of this structure having no negative comments on the construction of this structure.

4.05 Landfarm Containment

General Conditions

The landfarm containment is complete except for soil cover on the dykes in the area of the sump.

The landfarm was constructed to accommodate approximately 9000 m^3 of oil contaminated soil and seasonal water accumulations.

At the time of our inspection the landfarm was in operation and some sorting of contaminated materials had taken place.

There is considerable contaminated waste in the landfarm in addition to contaminated soil. No landfarming of treated contaminated soil has taken place.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

Stability

The structure appears stable as constructed.

Recommendations

We recommend that the remaining dyke structure, without protective cover over it, be covered as per the design drawings. This, however, is not an absolute requirement.

4.06 Contaminated Snow Containment

General Conditions

The construction of the contaminated snow containment structure is contiguous with the east end of the landfarm.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

The snow containment facility has a containment volume of 929 m^3 based on estimates of snow volume provided by the owner and only a small percentage of the capacity is utilized.

The structure has been constructed with good quality control.

Stability

The structure appears stable as constructed.

Recommendations

We have no recommendations with respect to this construction at this time.

4.07 Sediment Pond East

General Conditions

The construction of this sedimentation pond for drainage from the east side of the site is complete.

The basin is shaped and the liner has been installed throughout the basin from inlet to the berms on the north side of the basin.

There has been no cover placed over the liner to this point and rip rap has not yet been placed in the outlet weir.

The liner at the inlet has tears and punctures and water can leak out under the liner at this time.

Stability

We still have concerns over the stability of the liner and recommend possibly tire ballast over the liner which appears possibly subject to wind damage. This shall provide a function for used tires.

Recommendations

We recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift.

We further recommend the re-installation of the liner at the inlet.

4.08 Sediment Pond West

General Conditions

The construction of this sedimentation pond for drainage from the west side of the site is nearing completion except for the west end on the south side where the liner must be "tucked" in as set out in our report last year.

As well, the inlet culvert construction is allowing water to be conducted under the liner and must be repaired.

Stability

We have some concern over the stability of the liner on this pond as we have with the east pond and recommend the further use of tire ballast on the liner.

Recommendations

Complete construction at the inlet structure to ensure contaminated water flows into the containment and not under it.

4.09 Quarry

General Conditions

The quarry was inactive at the time of our review and most blasted rock had been removed from the quarry site.

Stability

Rock faces appear stable.

Recommendations

We have no recommendations to be made with respect to the quarry.

4.10 Loading Area Contaminated Storage (Now MP-HWB-1)

General Conditions

This area has been constructed near the loading dock to facilitate assembly of hazardous materials for shipment out. It appears that all material from the temporary hazardous storage containment have now been assembled here.

Construction appears to have taken place in accordance with standardized drawings prepared in the past.

Stability

Construction appears stable.

Recommendations

We have no recommendations with respect to this structure.

4.13 Fueling Facility Containment

General Conditions

A new fueling facility for the fueling of B trains is under construction utilizing design drawings prepared by our office.

Work conforms to the design drawing.

A second cell is now to be constructed south of the existing.

4.12 Overview

Work on containment structures is now almost complete and only the hazardous waste cells MP-HWB-3 and 4 require decommissioning.

Respectfully submitted,

Barry H. Martin, P. Eng., MRAIC

REGISTERED PROFESSIONAL ENGINEER
B. H. MARTIN
PROVINCE OF ONTARIO

Milne Inlet Photos

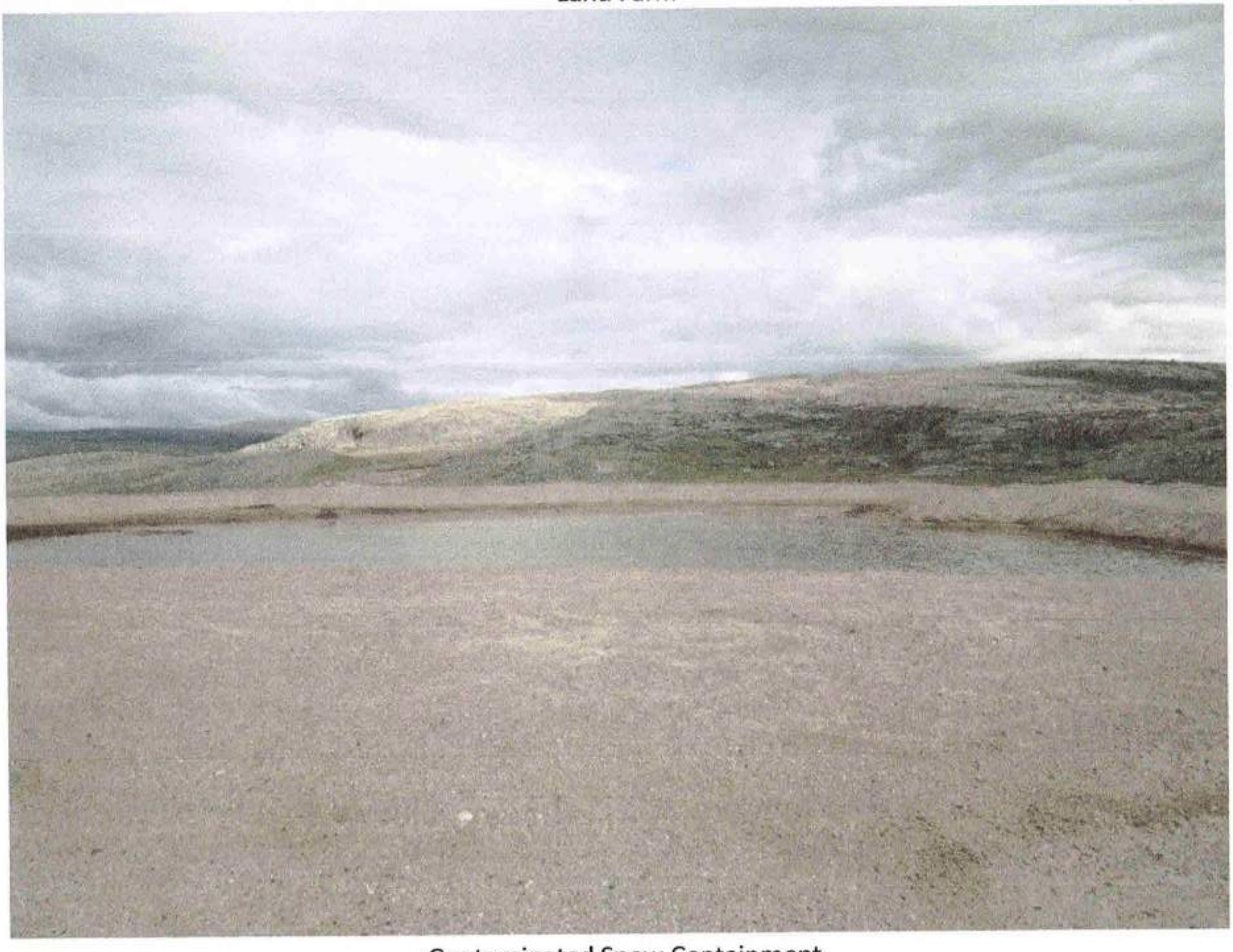
Hazardous Waste Storage MP-HWB-3

Hazardous Waste Storage MP-HWB-4

Fuel Tank Farm

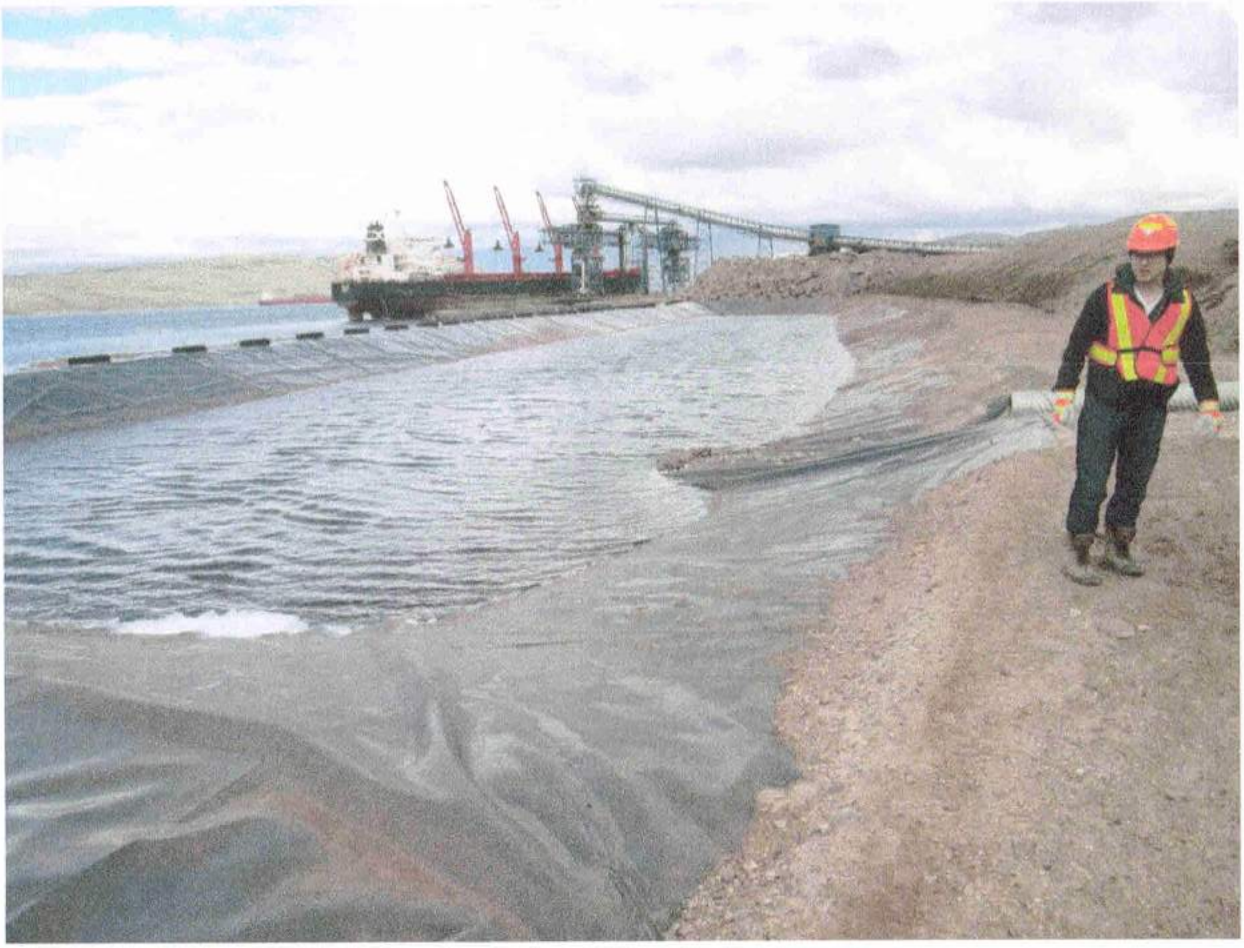
New Sewage Effluent Pond

Land Farm



Contaminated Snow Containment


Sediment Pond East


Sediment Pond West

Quarry

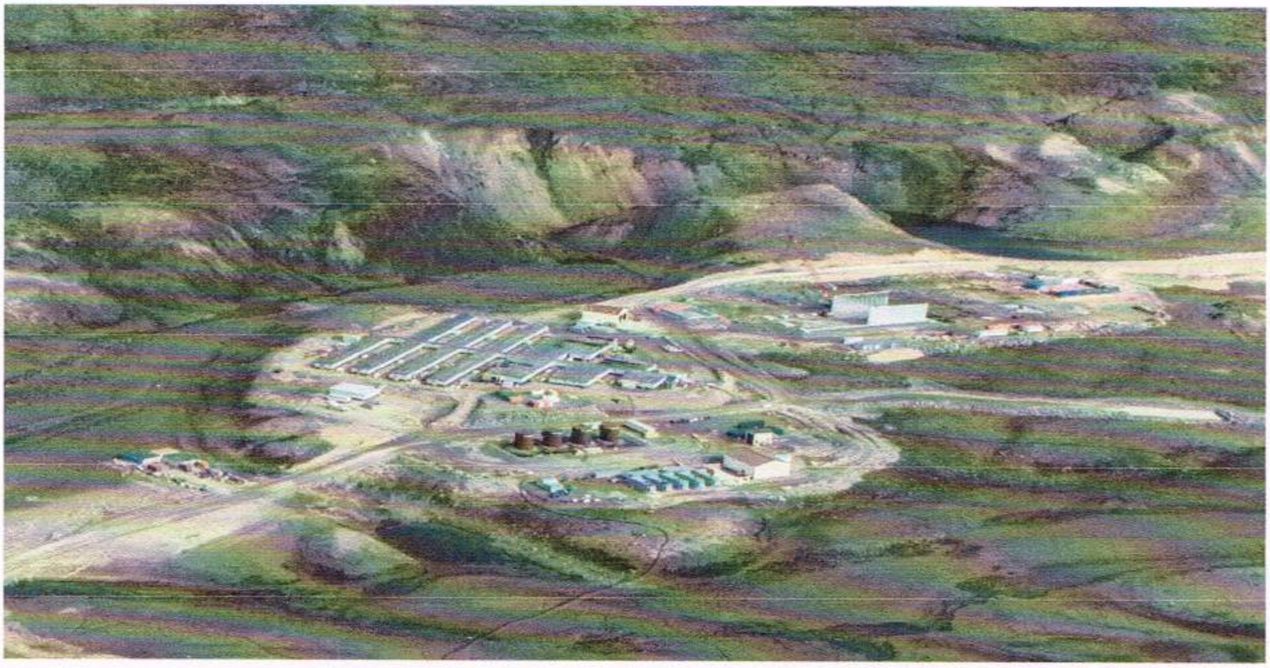
Loading Area Contaminated Storage MP-HWB-1

Fuelling Facility Containment

BHM Project No. 15-97

BAFFINLAND IRON MINES CORPORATION

ANNUAL GEOTECHNICAL INSPECTIONS
MARY RIVER PROJECT
SECOND INSPECTION OF TWO
October 2016



Prepared for:
Mr. Jeff Bush
Site Services Superintendent
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BARRY H. MARTIN

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November 15, 2016

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

Attention: Jeff Bush
jeff.bush@baffinland.com

RE: ANNUAL GEOTECHNICAL INSPECTIONS
BAFFINLAND IRON MINES CORPORATION
OUR REFERENCE NO. 15-097

1.0 INTRODUCTION

Barry H. Martin, P. Eng., Consulting Engineer, completed the eighth annual water licence geotechnical inspection of the following on-site engineered facilities as required by Licence No. 2AM-MRY 1325 of the Nunavut Water Board:

Pit Walls
Quarries
Landfills
Land Farms
Bulk Fuel Storage Facilities
Sediment Ponds
Collection Ponds
Polishing and Waste Stabilization Ponds

The inspection that took place October 5 to October 11th, 2016 is the second phase of a biannual inspection to be carried out within the open water shipping season at the two Baffinland sites, in Mary River at the mine site, and at Milne Inlet at the port facility. Although the shipping season extended into October, snow came early in mid September and although inspections were completed , the photos did not show well

The inspections were carried out in accordance with the guidelines set out in "Dam Safety Guidelines 2007" as published by the Canadian Dam Association.

The inspections were completed by Mr. Barry H. Martin, P. Eng., the design Engineer for the initial containment facilities both at Mary River and Milne Inlet, the runway extension, initial bridges on the connecting road, the solid waste disposal site as well as continuing construction of select mine infrastructure.

The seven previous annual water licences geotechnical inspections were completed by Mr. Martin. You shall note that Hazardous Waste Containment Structures have been assigned new designations in the report as compared to previous years.

The facilities inspected are as per the following:

Mary River Site

Bulk Fuel Storage Containment
Generator Fuel Storage Facility Containment
Polishing/Waste Stabilization Pond No. 1
Polishing/Waste Stabilization Ponds Nos. 2 and 3 (constructed as a two-cell structure)
Helicopter Fuel Cell Containment
Barrel Fuel Containment (constructed as a two-cell structure)(MS-HWB-3 and MS-HWB-4)
Hazardous Waste Storage (MS-HWB-2)
Enviro-Tank Storage (constructed contiguous with hazardous waste storage and stove oil storage) (MS-HWB-1)
Stove Oil Storage (MS-HWB-5)
Jet Fuel Tank and Pump Containment
Solid Waste Disposal Site
Minesite Steel Fuel Tank Farm Containment
Quarry
Crusher Pad Drainage Containment
Waste Pile Drainage Containment
Jet "A" Aircraft Containment
Hazardous Waste Containment (MS-HWB-6)

A site plan for the Mary River site showing most structures reviewed is attached.

Milne Inlet Site

Hazardous Waste Storage (constructed as a two-cell structure) (MP-HWB-3, and MP-HWB-4,)
Fuel Tank Farm
New Sewage Effluent Pond (PWSP)
Land Farm
Contaminated Snow Containment
Sediment Ponds East and West
Quarry
Loading Area Contaminated Storage (MP-HWB-1)
Fuelling Facility Containment

A site plan for the Milne Inlet site showing most structures reviewed is attached.

2.0 METHODOLOGY FOR INSPECTION

The geotechnical inspector was Barry H. Martin, P. Eng., who also reviewed the two sites for the first of the biannual inspections on July 28th to August 3rd, 2016 just as the annual shipping season commenced with the arrival of the first ship into port. This particular inspection took place just prior to the end of the shipping season. Although it was possible to complete inspections, snow came early at

Mary River in mid September, and as a result the inspections took place with 2" to 4" of snow on the ground.

The inspections primarily focused on the following aspects:

1. The structures were inspected for conformance with the design basis as presented in "as constructed" and "as-built" drawings (provided in the first and subsequent reports).

2. The structures were specifically inspected for settlement, cracking, and seepage through the berms.

3. The areas around the structures were examined for evidence of seepage.

4. Quarry walls were reviewed for relative stability. I note that the quarries are active removal areas and long term stability was not yet established.

5. New structures under construction were reviewed for conformity with design drawings.

6. Photographs were taken to document observations made during the inspection and are attached. These photos however are somewhat compromised by the slight snow cover.

3.0 MARY RIVER CAMP

3.01 General

Due to the very cold weather encountered during the inspection it was difficult to confirm moisture within the containment structures although ice was found in some.

A monitoring program is in place to test storm water that does accumulate within the containment structures. As reviewed, the water that does not meet the water licence effluent requirements is treated on site prior to release. In some cases, water collected within the structures has been pumped out.

At the Bulk Fuel Storage Facility Containment, the water that collects within the dyke is treated at the end of the containment structure. At the time of this inspection, the treatment equipment had been moved to another location.

As with the report last year, there are some new code names assigned to the containment structures.

We report on the new Jet "A" Fuelling Containment Structure and Hazardous Waste Containment for the first time.

As with the August report of this year there are new code names assigned to hazardous waste structures.

The Bulk Fuel Storage Containment (Exploration Phase Bladder Farm) is coming due for decommissioning but is still used to store barrels of fuel, lubricant cubes, and a large fuel tank at this time.

3.02 Bulk Fuel Storage Facility (Exploration Phase Bladder Farm)

General Conditions

The Bulk Fuel Storage Facility still exists but it is no longer utilized as a bulk fuel storage facility. There are a number of full fuel barrels and lubricant cubes now stored within the berms, as well as a large fuel tank.

The granular cover over the geotextile and liner is still in place within the containment structure awaiting land farming. There is water that is contained within the dykes at one end awaiting treatment.

There is now a ramp over the north end of the containment to permit access over the dyke for placing barrels and cubes for storage.

Stability

At the time of this initial review, water had not been removed for a period from within the containment and water was ponding above the level of the gravel within the bottom of the containment at the north end of the facility. This water was frozen in place as ice.

At the load-out end of the facility there was water ponding within the dykes as ice was present..

The soil structure is considered stable in the present condition and is in conformance with the design basis for the facility.

The presence of water within the structure and at the load-out area is an indication of the integrity of the liner.

The dykes have been built up this year to reinforce the concept of no loader travel over the dykes.

Recommendations

We have no recommendations with respect to this containment structure as it awaits decommissioning.

3.03 Generator Fuel Storage Containment (Exploration Phase)

This particular containment structure is currently being decommissioned. The fuel bladder that was contained within the dyke has been removed.

The granular fill over the geotextile and liner shall require landfarming with the material from the bulk fuel storage facility.

There is no indication that the liner is compromised and decommissioning should proceed when the granular cover is either moved to a land farm or other containment. There is ice within the structure.

3.04 Polishing/Waste Stabilization Pond #1

General Conditions

PWSP No. 1 continues to be utilized as a holding facility for sewage plant effluent that does not meet water effluent quality criteria.

Currently the pond is being used primarily as a repository for off spec sewage and sewage sludge forming in lift stations.

The supernatant from PWSP No. 1 is periodically decanted to PWSPs Nos. 2 and 3 where it is tested and treated as required to meet Water Licence effluent requirements.

At the time of our visit there was approximately fifty percent of capacity to accommodate further sewage and the structure readily conforms to its design intent.

Stability

Our review of this area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing sewage and there are no tears or ruptures in the membrane, excepting some minor tears from past activity at the top of the dyke well above the allowable effluent level in the structure in the horizontal portion of the membrane.

A review of the top of the dyke showed no indication of cracking or settlement which would indicate stresses within the structure.

Many of the tears that had occurred in the liner on the top of the dyke have been patched during the period between reviews in 2008 and 2009 and are holding well. As well, there are no signs of weather related deterioration of the liner where it is exposed.

There appears to be no sign of erosion of the dykes, even with the precipitation that has occurred over the lifetime of the facility.

The minor settlements have had little effect on the integrity of the structure.

Recommendations

We have no recommendations with respect to this containment facility.

3.05 Polishing Ponds/Waste Stabilization Ponds #2 and #3

General Conditions

The structure was designed and constructed as a two-cell structure.

The supernatant from PWSP #1 is currently discharged to PWSPs Nos. 2 and 3. The treated effluent is tested for Water Licence effluent requirements, treated if necessary, and discharged to the environment.

At the time of our visit there was considerable freeboard to accommodate further sewage and the structure readily conforms to its design intent. Both cells were almost empty and contained less than one foot of liquid as an ice covered liquid which was the capacity allowed for sludge in the original design.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing the sewage and there are no tears or ruptures in the membrane.

Longitudinal cracking which appeared in the dykes of PWSP #3 due to the melt of permafrost wedges in 2009 has not reoccurred and we consider this structure to be stable in its present condition.

Monitoring points have been set upon the top of the dyke and have been monitored since 2009. Settlements have occurred since that time. These settlements have not led to any stress cracks in the structure. Monitoring was discontinued last year.

There appears to be no sign of erosion of the dykes and plants are continuing to seed themselves on the dykes. This growth is minimal, however.

The small bubbles that were observed under the liner at the time of the last inspection were not evident with the colder weather that we have encountered

Recommendations

We have no recommendations with respect to this containment facility.

3.06 Helicopter Fuel Tank Containment

General Conditions

The structure was designed and constructed as a single cell structure that contains a 1000 gal fuel storage tank.

The structure currently conforms to its design intent.

In the past, a liner clad wood curb had been added to the top of the berm to prevent the erosion of gravel off the berm, caused by pulling the fuel hose from within the dyke out to the helicopters to provide them with fuel..

As it was the intent of the mine to use fuel that was available in barrels, a temporary cell had been constructed to contain the barrels with a one piece liner and wood timbers . This containment has been recently removed

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage.

A review of the exterior and the top of the berms showed no sign of cracking or settlement which would indicate stress within the structure.

The structure is considered to be stable in its present condition.

Recommendations

We have no recommendations with respect to this structure.

3.07 Barrel Fuel Containment (Now MS-HWB-3 and MS-HWB-4)

General Conditions

This particular structure which we called "Barrel Fuel Containment" in our previous inspection reports is a two-cell structure which is currently used to accommodate cubes of lubricant and barrels in the east cell and cubes of lubricant and antifreeze in the west cell.

Stability

Our review of the area around this containment structure showed no sign of seepage. There is water ponding in this structure as evidenced by the ice in the cell.

A review of the exterior and top of the dyke showed no sign of cracking or settlement which would indicate stresses within the structure.

The structure is considered to be stable in its present condition. The ice confirms the integrity of the liner.

Recommendations

We have no recommendations at this time.

3.08 Hazardous Waste Storage (Now MS-HWB-2)

General Conditions

This particular cell was constructed contiguous with an existing cell, which is referred to on site as the "Enviro Tank Storage", from drawings by our office in 2010 and conforms to our drawings. It is also contiguous with the Stove Oil Storage cell.

This structure contains barrels and bags of hazardous waste.

Stability

Our review of the area around this cell at the base of the slopes, showed no sign of seepage. There is water ponding in this structure as evidenced by ice in the cell.
The structure appears to be stable in its present condition. The ice confirms the integrity of the liner.

Recommendations

There are no recommendations at this time.

3.09 Enviro Tank Storage (Now MS-HWB-1)

General Conditions

This particular structure is constructed contiguous with the Hazardous Waste Storage constructed in 2010 and the Stove Oil Storage cell. It was utilized as a wash down cell during the last season. It is currently not being usedand access is blocked

Stability

Last year there was concern for the integrity of this cell as the cell was dry and the geotextile was exposed from heavy traffic during our initial inspection. During our second inspection, the cell was holding a small amount of water confirming limited integrity of the liner.

The cell is dry this year at both of the 2015 inspections raising concerns anew on the integrity of the liner.

Recommendations

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell

3.10 Stove Oil Storage (Now MS-HwB-5)

General Conditions

This particular structure had been used to store barrels of stove fuel in 2011.

The structure again contains barrels of stove oil and some Jet "A" fuel.

This structure was constructed in accordance with a standardized drawing provided by this office utilizing a one piece liner.

Stability

Our review of the exterior at the base of the dyke showed no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and the top of the dyke showed no sign of cracking or settlement which would indicate stresses with the structure.

There is ice contained within the cell confirming the integrity of the liner.

The structure is considered to be stable in its present condition.

3.11 Jet Fuel Tank and Pump Containment

General Conditions

This particular structure was reconstructed based on our recommendation of the 2012 Geotechnical Inspection.

The construction was completed in accordance with our recommendations for such structures and the liner was constructed as a one piece liner with geotextile protection on both sides and gravel over the geotextile as protection.

The construction appears proper and the structure is in good condition.

Minor water ponding confirms the integrity of the liner.

At this time as in our earlier inspection report this year, the jet fuel tank and pump have been removed and the cell is empty.

Stability

Our review of the area around the cell at the base of the slopes showed no sign of seepage and water is ponding within the cell.

.

The structure is stable in its present condition.

Recommendations

There are no recommendations at this time.

3.12 Solid Waste Disposal Site

The solid waste disposal site is currently entering the second phase of its construction. The first lift of solid waste has been placed and covered fully and appears to be doing exactly what it was proposed to do at the design stage. Since our last inspection in July/August the first lift has been expanded.

Work is currently continuing on building a berm on three sides of the disposal site at a level above the existing lift in advance of placing another lift. The berm is being constructed as per the berm on the first level that served well over the past several years,

The blow fence has not been reinstalled yet. In the meantime, solid waste has been covered as it is installed and may be continued to be done to control "blow".

There has been a fence structure of sections of screen and pallets to control snow drift at the activity area of the waste disposal site.

3.13 Minesite Steel Fuel Tank Farm Containment

General Conditions

All work appears to be complete including the installation of the sump pits that shall be utilized to facilitate the removal of water that collects from precipitation. These sump pit are installed at both ends of the containment.

There is ice forming in the bottom of the containment confirming the integrity of the liner. This ponding of water and current forming of ice is above the cover on the bottom of the containment in some areas.

Stability

All work appears to have been completed in accordance with drawings and we have no concerns with the stability of this containment structure.

Recommendations

We currently have no recommendations with respect to this containment structure.

3.14 Quarry QMR2

General Conditions

The quarry has well defined benches. The quarry faces at the benches appear clean.

The quarry is inactive at this time but definitely not closed.

.

The area where the road was undermined in September 2015 has undergone further quarrying and the access road is gone. This area is a fractured zone and subject to subsidence as we noted while on site.

Much of the blasted rock that was in the quarry at our last visit has now been removed

Care must be taken while quarrying in the unstable fractured zone.

3.15 Crusher Pad Drainage Containment

General Conditions

Although there was no moisture flowing to the catchment pond, it is evident that the ditches in place and the containment pond are operating as intended.

Stability

The structure has been completed in accordance with drawings included in our last report in a most satisfactory manner.

Recommendations

We have no recommendations with respect to this containment structure.

3.16 Waste Stockpile Drainage Containment

Stability

The dyke appears stable at this time.

This particular structure has now been completed. The structure is in place with only minor trimming required on the inlet side. The outfall hose to pump the supernatant water over to the Mary River watershed is in place with the pump in place on the dyke.

3.17 Jet "A" Fuel Containment

General Conditions

This cell was constructed to replace the containment structure near the Weatherhaven Camp.

This cell now contains two double walled tanks and is located north of the air terminal buildings.

Stability

The cell was constructed using a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the form of ice in the bottom of the cell confirming the integrity of the liner.

There were no signs of cracking of the dykes. A granular ramp has been constructed over the dyke to facilitate access for snow removal.

Recommendations

We have no recommendations with respect to this structure.

3.18 Hazardous Waste Containment (MS-HW-6)

General Conditions

Although it was constructed in 2012, we first reported on it in 2015.

It is located near the incinerator and is utilized to store barrels of ash from the incinerator. It is, however, empty at this time.

Stability

The cell was constructed utilizing a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the bottom of the cell confirming the integrity of the liner. This water is currently in the form of ice.

There were no signs of cracking of the dykes or seepage around the exterior of the dykes.

Recommendations

We have no recommendations with respect to this structure at this time..

3.19 Overview

This report is the second phase of the eighth annual Geotechnical Inspection at Mary River and Milne Inlet completed by this author on behalf of Baffinland Iron Mines Corporation and the second year of reporting covering the second of two inspections in one shipping season.

As set out in our past reports, there has been little or no erosion taken place from wind or rain and the dykes constructed of the sand/gravel soil have remained stable at slopes of 3:1 and 4:1.

As noted last year, there are only just now signs of settlement appearing at PSWP's 1, 2 and 3. The settlements are not differential settlements of the dykes but are minor overall settlements of the total structures with respect to the surrounding area.

These settlements appear to be settlements within the one metre ± active layer above the permafrost and are of little concern as the PWSP's are temporary structures and the settlements have no effect on the dyke stability.

It is expected that many of the structures that form the basis for the inspections set out in the biannual Geotechnical inspections shall be decommissioned as the mine facilities are finalized.

A number of these structures at Mary River are awaiting the construction of a land farm facility to facilitate the disposal of contaminated granular fill from the bottom of containment cells.

Mary River Photos

Bulk Fuel Storage Facility

Bulk Fuel Storage – Sump Installed

Generator Fuel Storage Containment

PWSP #1

PWSP #2

PWSP #3

Helicopter Fuel Tank Containment

Stove Oil Storage MS-HWB-1

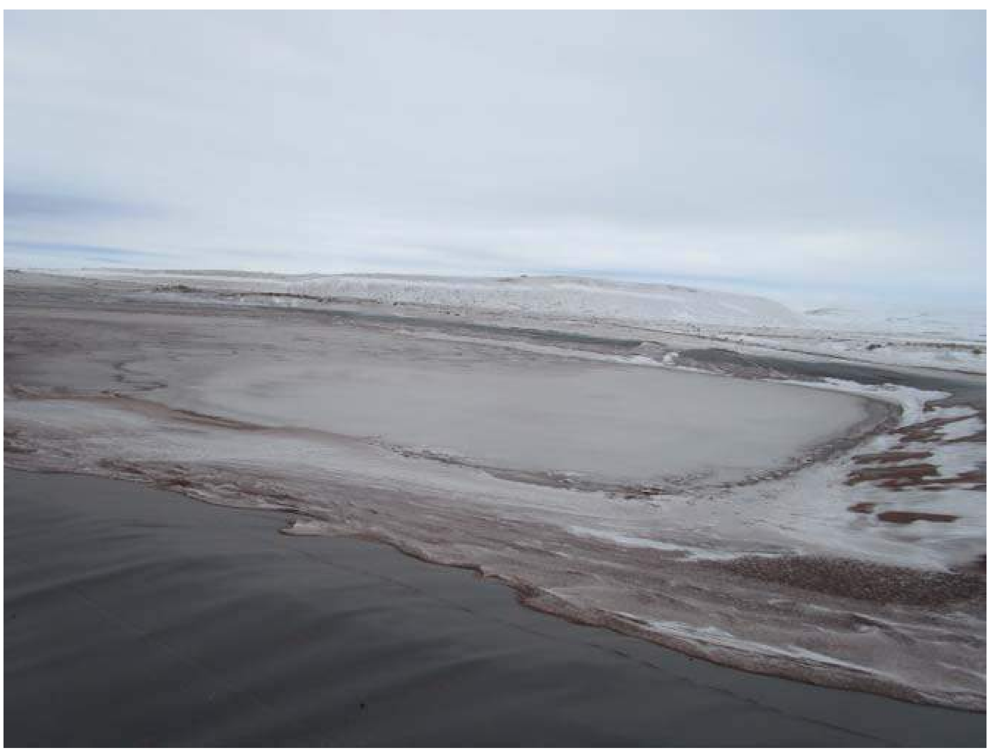
Enviro Tank Storage MS-HWB-5

Solid Waste Disposal Site

Barrel Fuel Containment MS-HWB-3

Barrel Fuel Containment MS-HWB-4

Mary River Quarry



Crusher Pad Drainage Containment

Hazardous Waste Containment MS-HWB-6

Waste Pile Drainage Containment

Jet “A” Fuel Containment

4.0 MILNE INLET

4.01 General

There are still changes taking place at Milne Inlet, since our last inspection in July/August of this year.

The sediment ponds at the shore that were under nearing completion are now fully operational with inlet ditching complete.

4.02 Hazardous Waste Storage (MP-HWB-3 and MP-HWB-4)

General Conditions

This particular structure has been constructed as a two-cell structure and is now only used to store a few items.

A new hazardous waste storage facility has now been constructed near the loadout area for storing hazardous waste to be shipped out and is in full operation at this time.

Stability

There is no water ponding in both cells of the original structure. We are advised that water has been pumped from these structures and sand in the structures contains ice.

Our review of the area around the dykes, at the base of the slopes, showed no sign of seepage. The structure is considered stable.

Recommendations

We have no recommendations with respect to the use of these two cells at this time. Prior to our inspection in September, we request that water not be pumped from the structures.

4.03 Fuel Tank Farm

General Conditions

Since both 2012 and 2013 the fuel tank farm has been expanded considerably with the addition of a number of new tanks. No tanks have been added since last season but there is room to place additional tanks.

During the last day of our earlier inspections, a major fuel oil spill took place. The berm around the containment effectively contained the pill. The sumps had not been installed at the time of the spill. These sumps have been installed.

Stability

We have minor water ponding at the low end of the containment confirming the integrity of the liner. This ponding is now in the form of ice in the bottom of the containment.

Recommendations

We have no recommendations with respect to the containment at this time.

4.04 New Effluent Pond (PWSP)

General Conditions

The pond was put into operation in 2014.

The containment pond was operating at approximately sixty-percent of capacity at the time of our inspection.

Stability

We noted no sign of weakness in any of the construction.

Recommendations

We have no recommendations with respect to the use of this structure having no negative comments on the construction of this structure.

4.05 Landfarm Containment

General Conditions

The landfarm containment is complete except for soil cover on the dykes in the area of the sump.

The landfarm was constructed to accommodate approximately 9000 m^3 of oil contaminated soil and seasonal water accumulations.

At the time of our inspection the landfarm was in operation and some sorting of contaminated materials had taken place. Since our last inspection, there is still minor sorting to take place including the removal of some waste and contaminated waste.

There is still some contaminated waste in the landfarm in addition to contaminated soil. No landfarming of treated contaminated soil has taken place.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

Stability

The structure appears stable as constructed.

Recommendations

We recommend that the remaining dyke structure, without protective cover over it, be covered as per the design drawings. This, however, is not an absolute requirement.

4.06 Contaminated Snow Containment

General Conditions

The construction of the contaminated snow containment structure is contiguous with the east end of the landfarm.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

The snow containment facility has a containment volume of 929 m^3 based on estimates of snow volume provided by the owner and only a small percentage of the capacity is utilized.

The structure has been constructed with good quality control.

Stability

The structure appears stable as constructed.

Recommendations

We have no recommendations with respect to this construction at this time. The structure appears as it did in our July/August review.

4.07 Sediment Pond East

General Conditions

The construction of this sedimentation pond for drainage from the east side of the site is complete.

The basin is shaped and the liner has been installed throughout the basin from inlet to the berms on the north side of the basin.

There has been no cover placed over the liner to this point and rip rap has not yet been placed in the outlet weir.

The tears and punctures that were present at the time of our July/August review have yet to be repaired.

Stability

We still have concerns over the stability of the liner and recommend possibly tire ballast over the liner which appears possibly subject to wind damage. This shall provide a function for used tires.

Recommendations

We recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift.

We further recommend the re-installation of the liner at the westerly Inlet such that the liner is shaped to the profile of the inlet ditch

4.08 Sediment Pond West

General Conditions

The construction of this sedimentation pond for drainage from the west side of the site is nearing completion except for the west end on the south side where the liner must be "tucked" in as set out in our report last year.

The inlet where the water was being conducted under the liner with gravel has been made good.

Stability

We have some concern over the stability of the liner on this pond as we have with the east pond and recommend the further use of tire ballast on the liner.

Recommendations

Complete construction at the inlet structures to ensure contaminated water flows into the containment and not under it. With snow conditions it was difficult to confirm the construction.

4.09 Quarry

General Conditions

The quarry was inactive at the time of our review and most blasted rock had been removed from the quarry site.

It appears that little or no quarrying has taken place since our last visit.

Stability

Rock faces appear stable.

Recommendations

We have no recommendations to be made with respect to the quarry.

4.10 Loading Area Contaminated Storage (Now MP-HWB-1)

General Conditions

This area has been constructed near the loading dock to facilitate assembly of hazardous materials for shipment out. It appears that all material from the temporary hazardous storage containment have now been assembled here.

Most hazardous waste has now been removed from the containment and shipped out.

Construction appears to have taken place in accordance with standardized drawings prepared in the past.

Stability

Construction appears stable.

Recommendations

We have no recommendations with respect to this structure.

4.13 Fueling Facility Containment

General Conditions

A new fueling facility for the fueling of B trains is completed utilizing design drawings prepared by our office.

Work conforms to the design drawing.

A second cell is now to be constructed south of the existing.

4.12 Overview

Work on containment structures is now almost complete and only the hazardous waste cells MP-HWB-3 and 4 require decommissioning.

Respectfully submitted,

Barry H. Martin, P. Eng., MRAIC

Milne Inlet Photos

Hazardous Waste Storage MP-HWB-4

Hazardous Waste Storage MP-HWB-5

Fuel Tank Farm

Milne Inlet Sewage Effluent Pond (PWSP)

Land Farm Containment

Contaminated Snow Containment

Milne Inlet Quarry

Loading Area Contaminated Storage MP-HWB-1

Fuelling Facility Containment

East Drainage Pond

East Drainage Pond. Westerly Inlet

APPENDIX C.3

PHOTO JOURNAL

C.3.1 MARY RIVER MINE SITE PHOTO SHEET

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PHOTO 2 - Mary River Mine Site Open Pit Bench, July 2016

PHOTO 3 - Loading Mary River Ore at Nuluujaak Pit, March 2016

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PHOTO 5 – Siltation mitigation measures at the toe of the Crusher Pad, July 2016

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PHOTO 7 - Mary River Mine Site Crusher Pad Ore Stockpile and, Engineered Drainage Ditch and Sedimentation Pond, July 2016

PHOTO 8 - Mary River Mine Site Accommodations Complex, Crusher and Maintenance Yard, July 2016

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PHOTO 10 - Mary River Exploration Camp and Waste Settling Ponds, July 2016

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PHOTO 3 – Ore Ship Being Loaded with Ore, September 2016

PHOTO 4 - Milne Port Ship loader Conveyor and Stockpile, 2016

PHOTO 5 - Milne Port Ship loader with Ore freighter berthed at Ore Dock, 2016

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PHOTO 7 - Aerial view of Milne Port Site and Ore Stockpile, July 2016

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PHOTO 2 – Steensby Port waste barrels being manifested for backhaul, August 2016

PHOTO 3 – Steensby Camp Structure Being Loaded for Transport to Milne Port, August 2016

PHOTO 4 - Aerial View of Steensby Port after Backhaul, August 2016

C.3.4 Mid-Rail Camp Photo Sheet

PHOTO 1 - Aerial View Mid-Rail Camp August 2016 - Camp was not occupied in 2016

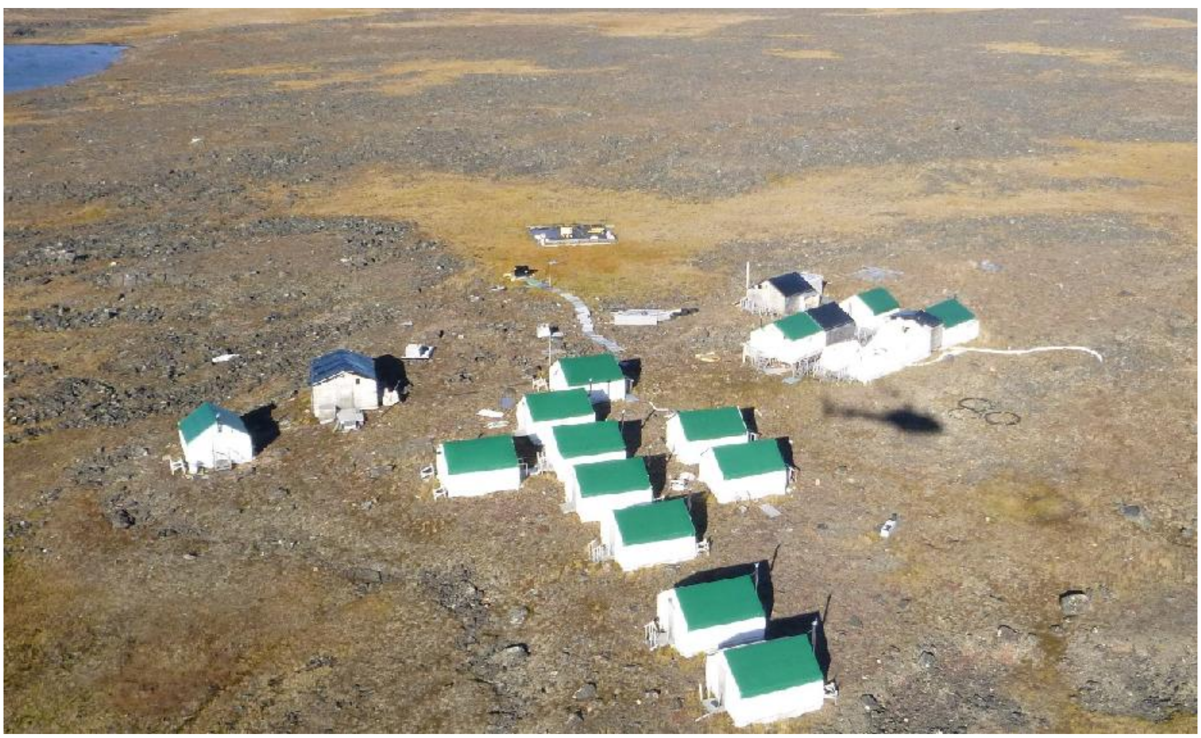
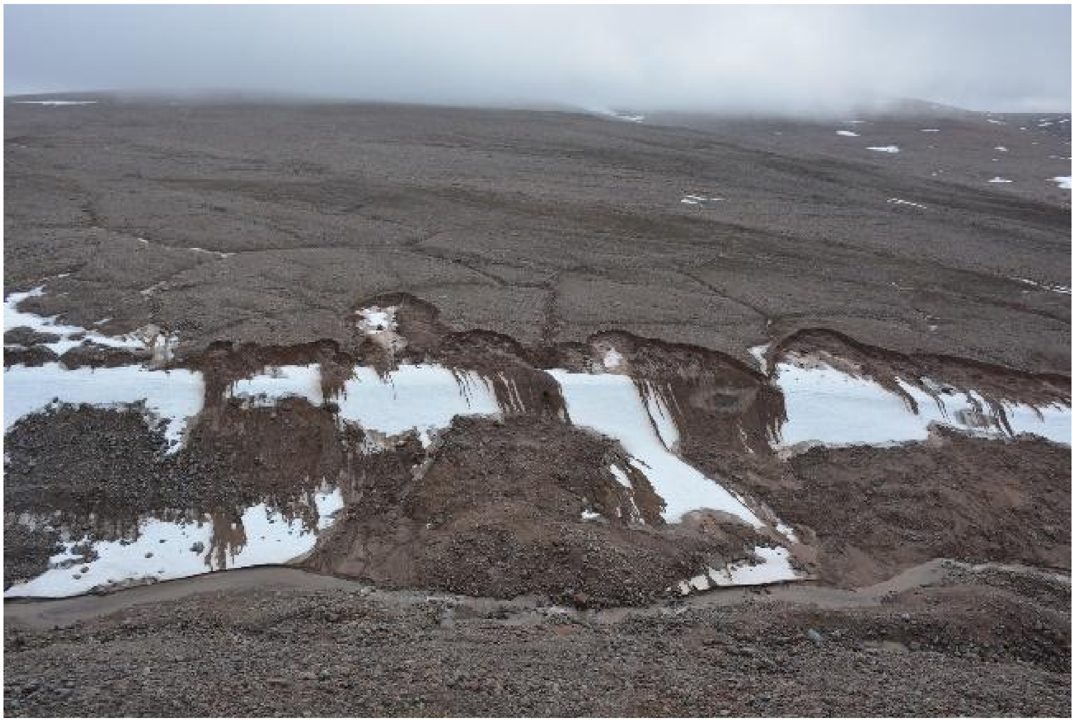


PHOTO 2 - Aerial View Mid-Rail Camp August 2016 - Camp was not occupied in 2016

C.3.5 Natural Sedimentation Events



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APPENDIX C.4

2016 DFO TOTE ROAD ANNUAL REPORT

BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

EARLY REVENUE PHASE - TOTE ROAD UPGRADES
FISH HABITAT MONITORING
2016 ANNUAL REPORT TO
DEPARTMENT OF FISHERIES AND OCEANS

Prepared By: William Bowden
Department: Environment
Title: Environmental Superintendent
Date: December 31, 2016

Signature:

Approved By: James Millard
Department: Environment
Title: Environmental Manager
Date: December 31, 2016
Signature:

Rev. No.	Revision	Date	Approved
0	Final	December 31, 2016	JM

ACKNOWLEDGEMENTS

This report was prepared by Baffinland Iron Mines Corporation (Baffinland) with support from North/South Consultants (NSC) Inc. of Winnipeg, Manitoba. NSC provided fisheries field work, reporting, design services, and technical review.

BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

EARLY REVENUE PHASE - TOTE ROAD UPGRADES FISH HABITAT MONITORING 2016 ANNUAL REPORT TO DEPARTMENT OF FISHERIES AND OCEANS

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SECTION 1.0 - INTRODUCTION

1.1 MARY RIVER PROJECT

The Mary River Project (the Project) is an iron ore mining project operated by Baffinland Iron Mines Corporation (Baffinland) located in the North Baffin region of Baffin Island, Nunavut. The Mary River Mine Site coordinates are approximately Latitude 71 degrees, 19' 35" North and Longitude 79 degrees 22' 30" West. Detailed descriptions of the Project and annual activities can be found in annual reports from Knight Piésold (2007b, 2008) and Baffinland (2009 to-2015, incl.).

Currently, the Tote Road is used as a means of transport for iron ore, personnel, equipment, and supplies between the Mary River Mine Site and Milne Port Site. Since 2013, there have been ongoing upgrades to sections of the road as part of the construction and operation of the Early Revenue Phase (ERP) for the Project. In order to safely and efficiently transport iron ore from the Mine Site to Milne Inlet during the early operational period of the mine, the existing Tote Road has been upgraded to accommodate and facilitate safe transit of large haul trucks and other vehicles. Work on these upgrades was initiated during the winter of 2013/14 and are still ongoing. Tote Road upgrades have included the following activities:

- Replacement of sea container crossings with free-span bridges (completed in 2014).
- Widening and twinning of the tote road at strategic locations.
- Straightening and realignment along specific road sections.
- Continued installation, movement and/or extension of culverts at identified stream crossings to improve transportation safety, minimize erosion/sedimentation, and fish passage.

As part of the response to the Fisheries Act Direction received by Baffinland from Environment and Climate Change Canada (ECCC) on June 7, 2016, Baffinland undertook various works during the summer of 2016 to minimize the potential for sedimentation and erosion. A Completion Report was submitted to ECCC on September 30 (Baffinland 2016) that summarized the actions that were taken over the summer of 2016. In addition, the Completion Report included Sedimentation and Dust Mitigation Action Plans. A critical item in the Sedimentation Mitigation Action Plan included the development and implementation of a Tote Road Earthworks Execution Plan (TREEP) to address outstanding concerns (damaged culverts, embankment erosion, etc.) along the Tote Road. The TREEP will outline timelines and measurable deliverables and will discuss the planned sedimentation mitigation measures to be completed along the Tote Road in 2017 and subsequent years.

1.2 AUTHORIZATION FOR WORKS

The Department of Fisheries and Oceans (DFO) (1998) defined Harmful Alteration, Disruption or Destruction (HADD) as, "any meaningful change in one or more habitat components that can reasonably be expected to cause a real reduction in the capacity of the habitat to support the life requisites of fish.” A HADD occurs when the physical, chemical, or biological features of a water body are sufficiently altered, such that habitat becomes less suitable for one or more life history processes of fish. Detailed descriptions of the 2007 HADD authorization (DFO File: NU-06-0084) and any related amendments and Letters of Advice can be found in previous annual reports (Knight Piésold 2007b, 2008; Baffinland 2009, 2010, 2011, 2012, 2013, 2014) and the Fish Habitat No Net Loss and Monitoring Plan is described by Knight Piésold (2007a).

A total of 25 crossings were identified (as HADD) under the August 2007 Fisheries Act Authorization, and 14 crossing were identified (as Habitat Compensation) in the August 2007 No Net Loss and Monitoring Plan. The locations of these crossings along the Tote Road are presented in Figure 1.1. Of these 25 crossings, three have since been identified as not fish-bearing and they no longer qualify as HADD sites (Baffinland 2010).

During 2016, no new Letters of Advice or Fisheries Authorizations were applied for or issued for the The Mary River Project.

1.3 REPORTING

A written report summarizing the monitoring results is to be submitted to the specified office locations of the Department of Fisheries and Oceans, Fish Habitat Management, Eastern Arctic Area, on or before December 31 of each year. Annual reports have already been submitted for the years 2007 to 2015, incl. (Knight Piésold 2007b, 2008 and Baffinland 2009, 2010, 2011, 2012, 2013, 2014, 2015).

The 2016 Annual Report, herein, covers the period of activity up to and including December 30, 2016. It summarizes the fish habitat monitoring results and provides a record for additional works or undertakings completed in accordance with the approved No Net Loss and Monitoring Plan (Knight Piésold 2007a) and conditions of the authorization, subsequent amendments, and recent Letters of Advice.

SECTION 2.0 - PROJECT DESCRIPTION

2.1 CONSTRUCTION WORK

Design summaries and descriptions of work along the Tote Road completed up to the end of 2009 are presented, in detail, in Knight Piésold (2007c) and Baffinland (2009). Recent road construction activities and installation of fish access improvement structures at some crossings are described in Baffinland (2010, 2011, 2012, 2013, 2014, and 2015).

In order to safely and efficiently transport iron ore from the Mine Site to Milne Inlet during the early operational period of the mine, the existing Tote Road has been further upgraded to accommodate the efficient and safe transit of large haul trucks and other vehicles. The first phase of the upgrades involved replacement of sea container crossings with bridges. Bridge installation was completed during the winter of 2013/14, but removal of the old sea container crossings is ongoing. Two of the four old sea can bridge crossings have been removed to date; CV 217b at km 80 and CV 128 at km 17 remain to be removed. Culvert re-installation, replacement and extension work was initiated during 2014 and also remains ongoing. Culvert installations/replacements were completed between December 2015 and the end of December 2016; however, the majority of these works occurred in non-fish-bearing streams and are, therefore, not considered further within the scope of this report. A summary of the completed work on fish bearing streams is provided in Table 2.1.

In spring 2016, Baffinland retained third party expertise, led by Golder Associates to perform work in order to mitigate erosion and sediment deposition in fisheries streams and receiving environments along the Tote Road, which contributed to the Fisheries Act Direction Baffinland received on June 7, 2016. The majority of this work focused on placing clean riprap and geo- textile fabric along strategic ditching locations that directly drained into fisheries crossings and receiving environments. The entirety of sedimentation, erosional mitigation and monitoring measures performed were summarized to ECCC, DFO, and Indigenous and Northern Affairs Canada (INAC) in six bi-weekly update reports culminating in a Completion Report submitted on September 30, 2016 (Baffinland 2016).

2.2 FISH HABITAT ASSESSMENT

Watercourses initially identified as HADD (n = 25) and compensation (n = 14) sites (Knight Piésold 2007a) were each assessed for the quality of available fish habitat at least once between 2006 and 2009 (Baffinland 2009). Detailed assessments for these sites are provided in Knight Piésold (2007b, 2008) and Baffinland (2009, 2010, 2011, 2012, 2013, 2014, 2015).

In 2016, monitoring was conducted at all fish-bearing crossings. Changes to the Tote Road included the replacement of sea container crossings with bridges (bridge installation completed during the winter of 2013/14; sea container removal ongoing), and the installation/extension of new culverts at existing crossings to accommodate road widening, straightening, and/or realignment. The emphasis of the 2016 monitoring program was to assess the presence of fish, habitat quality, and fish passage at the sites where upgrades had been completed and provide recommendations for sites yet to receive upgrades (refer to Tables 2.1 and 3.3).

Habitat surveys involved observations of substrate, gradient, flow characteristics, and potential fish use along 50 m reaches upstream and downstream of each crossing. Fish presence was determined through visual surveys and the use of a backpack electrofisher. In previous years, both methods have proven to be highly reliable techniques for determining fish presence/absence in the clear, shallow streams that are typical of the study area. Descriptions of habitat and condition of culverts were noted and photographs were taken. Results of aquatic monitoring are presented in Section 3.0.

Monitoring will continue in 2017 with descriptions of changes and potential impacts to be provided upon completion of upgrades on crossings for fish bearing streams, both historical and those to be outlined in the forthcoming TREEP (Table 2.2). It is expected that there will be some habitat gains (removal of sea container crossings) and losses (due to extension/lengthening of some existing culverts) that will need to be accounted for as work continues.

2.3 FISH HABITAT COMPENSATION

Compensation works completed for the Tote Road prior to 2009 are described in detail in Knight Piésold (2007a) and the results of recent compensation works (e.g., rustic fishway at BG-30) and detailed fish habitat and fish use surveys from 2009 to 2015 are presented in Baffinland (2009, 2010, 2011, 2012, 2013, 2014, and 2015). Following successful completion of habitat works at BG-30 (Baffinland 2012), there was a net habitat gain, which together with other gains met the compensation goals described in Knight Piésold (2007a). Fish presence upstream of the fishway in BG-30 has been confirmed during site visits from 2013-2016, indicating structural integrity and successful fish passage has been maintained.

2.4 SUMMARY OF DESIGN CHANGES

Modifications to accommodate upgrades to the Tote Road and specific water crossings to support the Early Revenue Phase of the Project that were completed in 2016 are presented in Table 2.1. Baffinland received approvals from the DFO in the form of Letters of Advice (refer to Appendix A) to proceed with these changes. As of November 30, 2015, work had been completed on the four bridge crossings and seven culvert crossings were worked on in 2015. During November 2016, CV 104 was replaced with 2 new 1.2m culverts, with clean riprap placed around the culvert ends to repair the previously damaged crossing. BG-50A, the Km 62 sea can bridge, was also removed in late November to rectify fish passage concerns. Currently the scope of planned future Tote Road crossing improvements are in development, and will be summarized in the TREEP. Baffinland Iron Mines will work with the Department of Fisheries and Oceans to ensure planned modifications to fish bearing crossings (Table 3.3) are in compliance of the federal *Fisheries Act*.

SECTION 3.0 - AQUATIC MONITORING

A monitoring plan was developed to ensure that all measures and works specified in the No Net Loss and Monitoring Plan (Knight Piésold 2007a), as well as the *Fisheries Act* Authorization and amendments, have been implemented and are functioning as intended. Details of aquatic monitoring conducted up to 2015 are provided in Knight Piésold (2007b, 2008) and Baffinland (2009, 2010, 2011, 2012, 2013, 2014, and 2015). Aquatic monitoring in 2016 focussed on assessing any changes to fish, habitat, and accessibility at fish-bearing crossings where replacement/installation of culverts occurred since November 2015.

3.1 CONSTRUCTION AND TURBIDITY MONITORING

There was no in-stream construction work in 2016 during periods of flow that required turbidity monitoring. However turbidity and flow monitoring was performed on 14 HADD crossings during June and July and August of 2016 (Table 3.1).

3.2 WATER QUALITY MONITORING OF BASELINE FISHERIES CULVERTS

Water quality monitoring data from Knight Piesold baseline monitoring work performed during 2005 and 2006, in conjunction with monitoring of the same crossings from 2015 and 2016 is presented in Table 3.2.

3.3 FISH USE ASSESSMENTS AT SELECT CROSSINGS

Fish use assessments in 2016 were conducted at all fish-bearing sites, including those where ERP upgrades had been completed by early July and those where potential future upgrades may proceed. Table 3.3 summarizes assessments conducted in 2016 and provides recommendations for future monitoring or construction works for 2017. Follow-up and corrective actions are also provided in Table 3.3, subsequent to receiving field reports from the fisheries biologist.

Five normally fish-bearing streams were dry or nearly dry in 2016, with no fish observed at the time of the survey in early July. Fish were observed at all remaining known fish-bearing crossings with generally unobstructed upstream passage through most of the culverts (Table 3.3). At the fish-bearing crossings where new construction works had been completed by early July 2016, most showed no issues with fish use of habitat or passage potential through the culverts. The old sea containers at BG-50A were becoming perched and impassable as of the early July survey and were subsequently removed in late November 2016. This should restore full access to all fish using the north channel of that stream. Removal of remaining sea containers at CV-128 and CV-217B is currently ongoing and planned to be completed by March 28, 2017.

To minimize the amount of sediment entering watercourses during freshet and damage to culverts along the Tote Road, a snow management plan with an emphasis on fish-bearing streams has been implemented to mitigate future sedimentation issues. During the Fall of 2016, fish-bearing streams were identified with roadside flags/markers. This will assist in providing visual reminders that identify fish habitat streams for routine equipment operations on the road.

Mild (e.g., CV-106) to severe (e.g., south channel at BG-50) perching of culverts has been noted at a few crossings (Table 3.3). Mild perching does not appear to have affected fish passage, but the crossing at BG-50 is sufficiently perched to prevent all upstream access for fish in the south channel, however fish passage is accessible in the north channel, especially with the removal of the perched sea can bridge at this crossing. In addition, the culverts at BG-01, though improved with the addition of a rocky ramp in 2008, are becoming increasingly perched through erosion and may become impassable in the near future. Crossings with mild perches will continue to be monitored in future years, but a Tote Road Earthworks Execution Plan (TREEP) is being developed to improve fish passage issues and erosion and sedimentation, which have been noted at several crossings (Table 3.3).

3.4 FISH USE ASSESSMENTS AT COMPENSATION SITES

All compensation works remain successful (including fish use of the rustic fishway installed at BG-30). For more details on habitat compensation activities, see Baffinland (2009, 2010, 2011, 2012, 2013, 2014, and 2015).

It is expected that there will be a reduction in the original HADD footprint size at crossings where bridges replaced sea containers and some change to the footprint size at crossings where new culverts are being installed and others replaced. Following completion of ERP upgrades and any additional works as recommended by the TREEP, HADD and compensation will be revisited to determine if sufficient compensation remains or if additional works will be required.

SECTION 4.0 - AUTHORIZED HADD CROSSING INSTALLATION SUMMARY

The locations for current authorized HADD crossings and habitat compensation sites are presented in Figure 1.1. As of November 30, 2008, all authorized HADD water crossings were installed. Remedial work up to August 2009 at the habitat compensation sites was substantially completed, and by October 2011 additional habitat compensation investigations and access structure installation were complete at select crossings. In 2012, new culverts were installed at two HADD crossings (BG-04 and BG-32) and habitat compensation works were completed at BG-30. No additional work was completed in 2013 due to pending potential upgrades to large portions of the Tote Road as part of the Early Revenue Phase of the Project. In 2013/14 bridges were installed at four crossings and culvert replacement/extension was initiated on another crossing. The now obsolete sea containers were removed from the CV-223 crossing during late fall 2014 and from BG-50 in late 2016, but have not yet been removed from two other crossings. A complete and updated list of the HADD crossings and habitat compensation sites, including crossing IDs, is provided in Table 4.1. The data in this table reflect those that were presented in detail in previous reports (Knight Piésold 2007b and 2008, Baffinland 2009), as well as the results from the most recent Tote Road surveys that were completed in 2010 (Baffinland 2010), 2011 (Baffinland 2011), 2012 (Baffinland 2012), 2013 (Baffinland 2013), 2014 (Baffinland 2014), and 2015 (Baffinland 2015).

SECTION 5.0 - REFERENCES

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TABLES AND FIGURES

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Table 2.1. Summary of changes to Tote Road crossings at fish-bearing streams completed from December 1, 2015 to December 30, 2016.

Crossing	Road Chainage (km.m)	Completed Work	Current Crossing Configuration	Fisheries Survey
CV104	A33+301	• Existing culverts replaced and extended to allow widening of the road and improve fish passage.	• 2 x 1.2m diameter	• Fish observed upstream and downstream. Though fish passage was observed, the upstream end of the culvert is damaged and a little steep, which may limit passage success
BG-50	62+081	• Bridge installed to replace old sea container crossing in 2014 Sea can bridge removed in November 2016	• Bridge	• Habitat under bridge ideal for Arctic Char use (cobble/riffle); old sea containers removed to restore habitat
		• Existing culverts replaced with large diameter culverts on new road alignment in right-hand channel	• 2 x 1.2m diameter	• Culverts are perched, preventing upstream access to fish in the right-hand channel

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Table 2.2. Technical summary of existing crossing structures installed at fish-bearing streams along the Tote Road.

Water Crossing	Culvert No.	Existing Road Chainage (km + m)	Existing Diameter of CSP Culverts (m) [1]							Fish Habitat Quality Rating [3]	Notes [4]
			Ø = 2.0 (m)	Ø = 1.2 (m)	Ø = 1.0 (m)	Ø = 0.5 (m)	Ø = 0.25 (m)	Ø = 0.15 (m)	Ø = 0.10 (m)		
CV169	-	A5+149	-	-	-	X	-	-	-	MAR	New
CV167		A5+820	-	-	-	X	-	-	-	MAR	-
CV129	B	A16+800	-	X	-	-	-	-	-	IMP	New
	C	A16+803	-	X	-	-	-	-	-	IMP	New
CV128		A16+807	-	-	-	-	-	-	-	IMP	Bridge
CV115	A	A27+193	-	-	-	X	-	-	-	MAR	-
	B	A27+200	-	-	X	-	-	-	-	MAR	-
CV114		A29+151	-	-	X	-	-	-	-	MAR	-
CV112	A	A30+947	-	X	-	-	-	-	-	IMP	-
	B	A30+951	-	X	-	-	-	-	-	IMP	-
	C	A30+953	-	X	-	-	-	-	-	IMP	
CV111		A31+489	-	-	X	-	-	-	-	IMP	-
CV106		A32+681	-	-	X	-	-	-	-	MAR	-
CV104	A	A33+301	-	X	-	-	-	-	-	MAR	New
	B	A33+307	-	X	-	-	-	-	-	MAR	New
CV102	A	A35+540	-	-	X	-	-	-	-	IMP	-
	B	A35+543	-	-	-	X	-	-	-	IMP	-
	C	A35+544	-	-	-	X	-	-	-	IMP	-
	D	A35+545	-	-	-	X	-	-	-	IMP	-
CV099	A	A37+351	X	-	-	-	-	-	-	IMP	New
	B	A37+343	X	-	-	-	-	-	-	IMP	New
CV087	A	A45+741	-	-	-	X	-	-	-	MAR	-
	B	A45+737	-	-	-	X	-	-	-	MAR	-
	C	A45+752	-	-	-	X	-	-	-	MAR	-
CV080		A50+002	-	-	X		-	-	-	IMP	-
CV079	A	A50+109	-	X	-	-	-	-	-	IMP	-
	B	A50+066	-	X	-	-	-	-	-	IMP	-
	C	A50+225	-	-	-	X	-	-	-	IMP	-
	D	A50+226	-	-	-	X	-	-	-	IMP	-

Table 2.2. Technical summary of existing crossing structures installed at fish-bearing streams along the Tote Road.

Water Crossing	Culvert No.	Existing Road Chainage (km + m)	Existing Diameter of CSP Culverts (m) [1]							Fish Habitat Quality Rating [3]	Notes [4]
			Ø = 2.0 (m)	Ø = 1.2 (m)	Ø = 1.0 (m)	Ø = 0.5 (m)	Ø = 0.25 (m)	Ø = 0.15 (m)	Ø = 0.10 (m)		
CV078	A	A50+680	-	X	-	-	-	-	-	IMP	-
	B	NA	-	-	X	-	-	-	-	IMP	-
	C	NA	-	-	X	-	-	-	-	IMP	-
	D	NA	-	-	X	-	-	-	-	IMP	-
CV076		A52+536	-	X	-	-	-	-	-	MAR	New
CV072	A	A53+830	-	X	-	-	-	-	-	IMP	-
	B	A53+345	-	X	-	-	-	-	-	IMP	-
	C	A53+379	-	X	-	-	-	-	-	IMP	-
CV071	B	A54+005	-	-	X	-	-	-	-	MAR	-
CV060	A	A58+114	-	-	X	-	-	-	-	IMP	-
	B	A58+114	-	-	X	-	-	-	-	IMP	-
CV059	A	A59+217	-	-	-	X	-	-	-	MAR	-
	B	A59+216	-	-	-	X	-	-	-	MAR	-
	C	A59+217	-	-	-	X	-	-	-	MAR	-
	D	A59+218	-	-	-	X	-	-	-	MAR	-
CV058	A	A59+779	-	-	-	X	-	-	-	MAR	-
	B	A59+773	-	X	-	-	-	-	-	MAR	-
CV057	A	A59+970	-	-	-	X	-	-	-	MAR	-
	B	A59+966	-	-	-	X	-	-	-	MAR	-
	C	A59+967	-	-	-	X	-	-	-	MAR	-
BG50	A	A62+054	-	-	-	-	-	-	-	IMP	bridge
	B	A62+081	-	X	-	-	-	-	-	IMP	New
	C	A62+081		X						IMP	New
CV049	A	A62+550	-	X	-	-	-	-	-	IMP	New
	B	A62+536	-	X	-	-	-	-	-	IMP	New
CV030	A	A77+495	-	X	-	-	-	-	-	MAR	-
	B	A77+435	-	-	-	X	-	-	-	MAR	-
BG32	A	A78+123	-	X	-	-	-	-	-	IMP	-
	B	A78+120	-	X	-	-	-	-	-	IMP	
CV217	A	79+854	X	-	-	-	-	-	-	IMP	-

Table 2.2. Technical summary of existing crossing structures installed at fish-bearing streams along the Tote Road.

Water Crossing	Culvert No.	Existing Road Chainage (km + m)	Existing Diameter of CSP Culverts (m) [1] Ø = 2.0 (m)	Ø = 1.2 (m)	Ø = 1.0 (m)	Ø = 0.5 (m)	Ø = 0.25 (m)	Ø = 0.15 (m)	Ø = 0.10 (m)	Fish Habitat Quality Rating [3]	Notes [4]
	B	80+000	-	-	-	-	-	-	-	IMP	bridge
CV216	A	A80+951	-	X	-	-	-	-	-	MAR	-
	B	A80+580	-	X	-	-	-	-	-	MAR	-
	C	A80+582	-	X	-	-	-	-	-	MAR	-
BG30		A84+636	-	-	X	-	-	-	-	IMP	-
BG29		A84+706	-	-	X	-	-	-	-	IMP	-
BG27		A86+499	-	-	-	X	-	-	-	MAR	-
BG24	A	A87+588	-	X	-	-	-	-	-	IMP	-
	B	A87+610	-	X	-	-	-	-	-	IMP	-
	C	A87+612	-	X	-	-	-	-	-	IMP	-
BG17	A	A90+016	-	X	-	-	-	-	-	IMP	-
	B	A90+019	-	X	-	-	-	-	-	IMP	-
BG04	A	A93+992		X	-	-	-	-	-	IMP	-
	B	A93+993	-	X	-	-	-	-	-	IMP	-
	C	A93+996	X							IMP	
CV001	A	A94+606	-	15	-	X	-	-	-	IMP	-
	B	A94+351	-	-	X	-	-	-	-	IMP	-
	C	A94+353	-	-	-	X	-	-	-	IMP	-
CV223	A	A97+007	-	-	-	-	-	-	-	IMP	bridge
	B	A97+050	X	-	-	-	-	-	-	IMP	-
	C	A97+052	-	X	-	-	-	-	-	IMP	-
	D	A97+082	-	X	-	-	-	-	-	IMP	-
	E	A97+084	-	X	-	-	-	-	-	IMP	-
CV224	A	A97+576	-	-	X	-	-	-	-	IMP	-
	B	A97+578	-	-	X	-	-	-	-	IMP	
CV225	A	A98+845	-	X	-	-	-	-	-	IMP	New
	B	A98+804	-	X	-	-	-	-	-	IMP	New
BG01	A	A99+483	-	X	-	-	-	-	-	IMP	-
	B	A99+483	-	X	-	-	-	-	-	IMP	-

Table 2.2. Technical summary of existing crossing structures installed at fish-bearing streams along the Tote Road.

Water Crossing	Culvert No.	Existing Road Chainage (km + m)	Existing Diameter of CSP Culverts (m) [1]							Fish Habitat Quality Rating [3]	Notes [4]
			Ø = 2.0 (m)	Ø = 1.2 (m)	Ø = 1.0 (m)	Ø = 0.5 (m)	Ø = 0.25 (m)	Ø = 0.15 (m)	Ø = 0.10 (m)		
	C	NA	-		-	X	-	-	-	IMP	-
CV186	A	A102+812	-	-	X	-	-	-	-	IMP	-
CV187	A	A102+856	-	-	-	X	-	-	-	MAR	-
	B	NA	-	-	X	-	-	-	-	MAR	-

1 – CSP = Corrugated steel pipe; Ø = culvert diameter
2 – Final length and survey culvert installation data to be provided in issued for construction drawings
3 – MAR = marginal, IMP = important
4 – New = culvert installed or worked on in 2015 or 2016 along realigned section of the road

Table 3.1. Construction and turbidity monitoring for 2016 at fish bearing crossings.

Culvert ID	Sample Date	Crossing Location	Distance from Crossing (m)	Turbidity (NTU)	Average Wetted Channel Width (m)	Depth (m)	Surface Velocity Estimate (m/s)
BG01	2016-06-02	Upstream	-	-	1.5	0.15	0.83
		Crossing	0	0.0			
		Downstream	50	0.0			
CV225	2016-06-09	Upstream	50	4.7	8	0.15	1
		Crossing	0	5.1			
		Downstream	75	5.9			
CV223	2016-06-09	Upstream	100	4.9	25	0.25	0.75
		Crossing	1	6.6			
		Downstream	100	8.4			
BG17	2016-06-09	Upstream	50	6.0	10	0.3	1
		Crossing	1	8.0			
		Downstream	50	8.7			
BG24	2016-06-03	Upstream	15	53.6	2	0.1	0.13
		Crossing	0	39.6			
		Downstream	10	38.5			
BG29	2016-06-09	Upstream	50	34.1	5	0.35	0.5
		Crossing	1	29.0			
		Downstream	50	24.4			
BG30	2016-06-03	Upstream	10	216.0	1.5	0.03	0.1
		Crossing	0	242.0			
		Downstream	10	234.0			
CV040	2016-06-04	Upstream	2	98.7	2	0.05	0.12
		Crossing	0	97.6			
		Downstream	50	111.0			

Table 3.1. Construction and turbidity monitoring for 2016 at fish bearing crossings.

Culvert ID	Sample Date	Crossing Location	Distance from Crossing (m)	Turbidity (NTU)	Average Wetted Channel Width (m)	Depth (m)	Surface Velocity Estimate (m/s)
CV047	2016-06-09	Upstream	50	59.4	5	0.15	0.75
		Crossing	2	80.1			
		Downstream	50	68.7			
CV049	2016-06-04	Upstream	-	-	5	0.05	0.36
		Crossing	0	29.4			
		Downstream	75	27.8			
CV099	2016-06-05	Upstream	50	25.2	2	0.05	1
		Crossing	0	22.9			
		Downstream	25	10.6			
CV111	2016-06-05	Upstream			1	0.07	0.8
		Crossing	0	165.0			
		Downstream	30	436.0			
CV112	2016-06-05	Upstream	40	19.0	1	0.2	0.7
		Crossing	0	301.0			
		Downstream	40	241.0			
BG01	2016-06-28	Upstream	100	2.5	4.4		-
		Culvert	0	1.9			
		Downstream	100	2.1			
	2016-07-02	Upstream	150	1.5	3.5	0.10	0.30
		Culvert	0	1.4			
		Downstream	150	1.3			

Table 3.1. Construction and turbidity monitoring for 2016 at fish bearing crossings.

Culvert ID	Sample Date	Crossing Location	Distance from Crossing (m)	Turbidity (NTU)	Average Wetted Channel Width (m)	Depth (m)	Surface Velocity Estimate (m/s)
CV225	2016-06-29	Upstream	90	1.1			-
		Culvert	0	1.3			
		Downstream	100	1.0			
CV224	2016-06-28	Upstream	100	1.9	5.3	0.5	-
		Culvert	0	1.9			
		Downstream	85	1.5			
CV223	2016-06-27	Upstream	-	-	-	-	-
		Culvert	0	16.4			
		Downstream	139	8.7			
	2016-06-28	Upstream	73	7.0	20	-	-
		Culvert	0	7.4			
		Downstream	100	8.3			
BG04	2016-06-28	Upstream	100	0.9	4	0.54	-
		Culvert	0	1.1			
		Downstream	98	1.2			
BG17	2016-06-27	Upstream	100	4.4	-	0.55	-
		Culvert	0	4.6			
		Downstream	100	4.6			
	2016-06-28	Upstream	100	4.3	0.58	0.8	-
		Culvert	0	4.6			
		Downstream	100	4.5			
	2016-07-03	Upstream	100	4.0	3.3	0.53	0.01
		Culvert	0	4.3			
		Downstream	100	4.7			

Table 3.1. Construction and turbidity monitoring for 2016 at fish bearing crossings.

Culvert ID	Sample Date	Crossing Location	Distance from Crossing (m)	Turbidity (NTU)	Average Wetted Channel Width (m)	Depth (m)	Surface Velocity Estimate (m/s)
BG24	2016-06-27	Upstream	100	1.1	2.5	0.4	-
		Culvert	0	1.0			
		Downstream	68	1.2			
	2016-06-29	Upstream	100	1.0	4.8	0.2	-
		Culvert	10	0.9			
		Downstream	100	0.9			
BG28	29/6/2016	Upstream	40	4.4			-
		Culvert	2	9.6			
		Downstream	50	102.1			
	2016-07-03	Upstream	80	2.6	0.5	0.05	0.18
		Culvert	0	8.7			
		Downstream	100	11.7			
BG29	2016-06-29	Upstream	25	5.8	2	0.1	-
		Culvert	0	6.4			
		Downstream	100	5.4			
BG31	2016-06-29	Upstream	100	6.9	1.3	0.12	-
		Culvert	0	4.5			
		Downstream	100	16.5			
	2016-07-03	Upstream	75	2.8	0.5	0.02	0.52
		Culvert	0	3.4			
		Downstream	75	12.3			
CV216	2016-06-29	Upstream	-	1.1	2.6	0.15	-
		Culvert	0	2.1			
		Downstream	70	1.8			

Table 3.1. Construction and turbidity monitoring for 2016 at fish bearing crossings.

Culvert ID	Sample Date	Crossing Location	Distance from Crossing (m)	Turbidity (NTU)	Average Wetted Channel Width (m)	Depth (m)	Surface Velocity Estimate (m/s)
CV217	2016-06-29	Upstream	20	1.4	-	-	-
		Culvert	-	-			
		Downstream	6	1.4			
BG32	2016-06-29	Upstream	100	1.3	-	-	-
		Culvert	5	0.8			
		Downstream	100	0.9			
CV040	2016-06-29	Upstream	100	1.3	-	-	-
		Culvert	5	1.8			
		Downstream	130	1.7			
CV049	2016-06-29	Upstream	10	0.9			-
		Culvert	10	0.9			
		Downstream	125	1.0			
BG50	2016-06-30	Upstream	100	1.0			-
		Culvert	0	1.3			
		Downstream	100	0.5			
CV060	2016-06-30	Upstream	75	1.1			-
		Culvert	0	0.1			
		Downstream	60	1.4			
CV072	2016-06-30	Upstream	60	0.9			-
		Culvert	0	1.0			
		Downstream	75	1.1			
CV078	2016-06-30	Upstream	104	0.5			-
		Culvert	10	0.3			
		Downstream	59	1.1			

Table 3.1. Construction and turbidity monitoring for 2016 at fish bearing crossings.

Culvert ID	Sample Date	Crossing Location	Distance from Crossing (m)	Turbidity (NTU)	Average Wetted Channel Width (m)	Depth (m)	Surface Velocity Estimate (m/s)
CV079	2016-06-30	Upstream	60	1.4			-
		Culvert	0	1.1			
		Downstream	50	1.1			
CV093	2016-06-30	Upstream	14	2.7			-
		Culvert	0	5.9			
		Downstream	61	1.3			
CV099	2016-06-30	Upstream	100	1.3			-
		Culvert	7	1.2			
		Downstream	115	1.2			
CV104	2016-06-30	Upstream	60	0.8			-
		Culvert	0	1.0			
		Downstream	20	0.8			
CV111	2016-06-30	Upstream	70	1.5			-
		Culvert	0	1.1			
		Downstream	75	1.4			
CV114	2016-06-30	Upstream	75	0.9			-
		Culvert	0	1.3			
		Downstream	80	2.2			
CV128	2016-06-30	Upstream	100	12.6			-
		Culvert	7	17.0			
		Downstream	100	14.5			
CV129	2016-06-29	Upstream	20	1.4			-
		Culvert	10	13.1			
		Downstream	-	-			

Table 3.1. Construction and turbidity monitoring for 2016 at fish bearing crossings

Culvert ID	Sample Date	Crossing Location	Distance from Crossing (m)	Turbidity (NTU)	Average Wetted Channel Width (m)	Depth (m)	Surface Velocity Estimate (m/s)
CV128	2016-08-25	Upstream	100	-3.3	50.0	0.50	-
		Downstream	100	-3.2			
CV099	2016-08-25	Upstream	100	-4.1	2.8	0.25	-
		Downstream	100	-3.8			
CV078	2016-08-25	Upstream	90	-3.4	2.5	0.30	-
		Downstream	105	-3.8			
BG50	2016-08-25	Upstream	90	-3.8	10.0	0.35	-
		Downstream	90	-3.8			
CV040	2016-08-25	Upstream	150	-0.7	9.5	0.11	-
		Downstream	50	-3.1			
CV217	2016-08-26	Upstream	100	-2.6	100.0	0.80	-
		Downstream	100	0.6			
BG24	2016-08-26	Upstream	100	-4.0	1.5	0.50	-
		Downstream	60	-1.5			

Notes:

-Monitoring results from June 2 to June 9 impacted by freshet during construction mitigation measures. Monioring results from subsequent monitoring rounds display much lower turbidity values

.-Probable minor YSI calibration calibration offset for turbidity monitoring data from August 25, however these values indicate turbidity values <1 or <0.5 NTU.

.-Physical characteristics and flow measurements not taken for every monitroing event due to equipment restrictions

.-YSI 6820 V2 and YSI PRODSS utilised for in situ turbidity monitoring data. Hach FH950 Flow Meter utilised for in situ flow monitoring data

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Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-025 (CV128)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3]	Dates										
	2005	2006	2015	2016	2010	14-Jun-06	03-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16
In Situ Parameters									US	DS	US	DS	US	DS	DS	US
Temperature (^oC)	-	-	-	-	-	0.32	10.41	3.66	-	-	7.2	7.2	6.1	7.7	9.6	9.2
Specific Conductance (mS/cm)	-	-	-	-	-	0.13	0.12	0.16	0.53	0.58	0.139	0.139	NA	NA	0.169	0.116
Dissolved Oxygen	-	-	-	-	5.5-9.5	13.02	11.71	13.03	-	-	105.9	105.1	103.5	106.2	101.6	103.7
pH	-	-	-	-	6.5 - 9.0	8.18	8.12	8.21	8.33	8.14	8.30	8.20	7.90	8.30	8.09	8.05
Wetted Width (m)	-	-	-	-	-	76.00	120.00	99.00	-	-	50.00	50.00				
Average Depth (m)	-	-	-	-	-	too much ice	0.30	0.60	-	-	0.50	0.50				
Flow Rate (m^3/s)	-	-	-	-	-	-	26.73	-	-	-	-	-				
Physical Parameters																
pH	-	-	0.01	0.10	6.5 - 9.0	7.85	7.37	7.51	7.79	7.84	8.16	8.04	8.11	8.15	8.08	8.20
Conductivity (uS/cm)	1.00	5.00	-	-	-	145.00	125.00	166.00	-	-	-	-	-	-	-	-
Turbidity (NTU)	0.10	0.10	0.10	0.10	-	0.60	0.70	-	1.10	1.19	0.45	0.45	10.20	10.80	0.28	0.28
Hardness (mg/L $CaCO_3$)	0.50	1.00	10.0	10.0	-	73.0	65.0	85.0	42.0	42.0	63.0	62.0	58.0	53.0	84.0	84.0
TSS				2.0					<2.0	<2.0	<2	<2	54.8	44.4	<2.0	7.9
TDS	30	5	20	20	-	94	81	108	77	67	72 *	67 *	50	240	78	79
Dissolved Anions																
Alkalinity (mg/L CaCO3)	2.0	5.0	10	10	-	72.0	67.0	86.0	37.0	41.0	61.0	61.0	42.0	38.0	84.0	84.0
Br^-	0.30	0.05	-	-	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-
Cl^-	0.20	1.00	0.50	0.50	-	1.00	<1	1.00	0.53	0.54	0.85	0.89	0.62	0.60	1.46	1.49
Fluoride				0.02							-	-	<0.020	<0.020	<0.020	<0.020
SO_4^-	0.50	1.00	0.30	0.76	-	2.00	<1	4.00	0.42	0.47	0.00	0.00	0.38	0.36	1.18	1.19
Nutrients																
NH_3+NH_4 (mg/L N)	0.10	0.02	0.15	0.15	0.021 - 231(4)	0.10	0.03	0.08	<0.015	<0.015	<0.15	0.19	<0.15	<0.15	<0.15	<0.15
NO_2^- (mg/L N)	0.06	0.01			0.06	<0.005	<0.005	0.02								
NO_3^- (mg/L N)	0.05	0.10	0.02	0.02	2.90	<0.10	<0.10	<0.10	<0.02	<0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
NO_2+NO_3 (mg/L N)	0.06	0.10			-	<0.10	<0.10	<0.10								
Ammonia, Total as N				0.02									<0.020	<0.020	<0.020	<0.020
Total Phosphorus	0.02	0.01	0.003	0.003	-	<0.01	<0.01	0.03	0.0036	0.0044	0.0039	0.0031	0.0677	0.0354	0.0044	0.0085
Dissolved Phosphorus													-	-	-	-
Organic Compounds																
Phenols	0.00	0.00	0.00	-	0.004	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-
DOC	-	-	0.50	1.00		-	-	-	1.70	1.60	1.70	1.60	<1.0	<1.0	1.80	1.60
TOC	-	-	0.50	1		-	-	-	1.90	1.90	1.70	1.70	1.80	1.40	1.80	2.90
TKN	-	-	0.10	0.15		-	-	-	<0.015	<0.015	<0.15	0.19	<0.15	<0.15	<0.15	<0.15
Chlorophyll-a	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																
Aluminum	0.004	0.0050	0.010	0.010	0.005 - 0.100(5)	0.01	0.01	0.101	0.03	0.03	0.02	<0.010	0.83	0.76	<0.010	0.01
Antimony				0.00010									<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	0.005	0.001	0.0010	0.00010	0.01	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.00010	<0.00010	0.0002	0.0002	0.0001	<0.00010
Barium	0.001	0.01	-	0.00020	-	<0.01	<0.01	<0.01	-	-	-	-	0.00801	0.00742	0.00663	0.00672
Berylium				0.00010									<0.00010	<0.00010	<0.00010	<0.00010
Bismuth				0.00005									<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.05	0.01	-	0.010	-	<0.01	<0.01	<0.01	-	-	-	-	<0.010	<0.010	<0.010	<0.010
Cadmium	0.0001	0.0001	0.00010	0.000010	0.00002	<0.0001	<0.0001	<0.0001	<0.000090	<0.000090	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium	0.05	1.00	0.50	0.50	-	17	16	20	9.47	9.42	15.0	15.2	12.5	11.6	19.1	19.4
Cecium				0.00001									0.00006	0.00006	<0.000010	<0.000010
Chromium	0.001	0.001	-	0.00050	-	<0.001	<0.001	<0.001	-	-	-	-	0.00125	0.00115	<0.00050	<0.00050
Cobalt	0.0003	0.0002	-	0.00010	-	<0.0002	<0.0002	<0.0002	-	-	-	-	0.00042	0.00038	<0.00010	<0.00010
Copper	0.0008	0.0010	0.0010	0.0010	0.002 - 0.004(6)	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.00140	0.00130	<0.0010	<0.0010
Iron	0.02	0.03	0.05	0.050	0.30	<0.03	<0.03	0.12	<0.050	<0.050	<0.050	<0.050	0.805	0.734	<0.050	<0.050
Lead	0.0002	0.0010	0.00050	0.00010	0.001 - 0.007(7)	<0.001	<0.001	<0.001	<0.00050	<0.00050	<0.00010	<0.00010	0.00069	0.00061	<0.00010	<0.00010
Lithium				0.0010									0.0016	0.0014	<0.0010	<0.0010
Magnesium	0.005	1.00	0.5	0.050	-	7.00	6.00	8.00	4.24	4.27	6.97	7.23	6.39	5.86	8.93	8.60
Manganese	0.001	0.01	0.001	0.00050	-	<0.01	<0.01	<0.01	0.0012	0.0013	0.0010	0.0006	0.02470	0.02150	0.0018	0.0027

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-025 (CV128)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3]	Dates										
	2005	2006	2015	2016	2010	14-Jun-06	03-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16
Mercury	0.0001	0.0001	0.00001	0.00001	0.000026	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	0.0003	0.005	0.001	0.000050	0.07	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	0.000059	0.000062	0.000157	0.000164
Nickel	0.001	0.005	0.0010	0.00050	0.025 - 0.150(8)	<0.005	<0.005	<0.005	<0.0010	<0.0010	<0.0010	<0.0010	0.00093	0.00085	<0.00050	<0.00050
Phosphorus				0.050									0.054	<0.050	<0.050	<0.050
Potassium	0.02	0.01	1.0	0.050	-	0.51	0.35	0.51	<1.0	<1.0	0.45	0.45	0.687	0.670	0.564	0.561
Rubidium				0.00020									0.00235	0.00231	0.00121	0.00122
Selenium	0.01	0.001	0.0004	0.0001	0.001	<0.001	<0.001	<0.001	<0.00040	<0.00040	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon				0.0500									1.980	1.750	0.437	0.451
Silver	0.0001	0.0001	-	0.0001	0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	0.05	0.05	0.50	0.50	-	0.61	0.34	1.15	<0.50	0.89	0.62	0.63	<0.50	<0.50	0.89	0.88
Strontium	0.0010	0.0010	-	0.0010	-	0.012	0.010	0.015	-	-	-	-	0.0074	0.0070	0.0114	0.0116
Sulphur				0.50									<0.50	<0.50	<0.50	0.64
Tellurium				0.00020									<0.00020	<0.00020	<0.00020	<0.00020
Thallium	0.0002	-	0.0003	0.000010	0.0008	-	-	-	<0.00030	<0.00030	<0.000010	<0.000010	0.000016	0.000014	<0.000010	<0.000010
Thorium				0.00010									0.00138	0.00131	<0.00010	<0.00010
Tin	0.0010	0.010	-	0.00010	-	<0.01	<0.01	<0.01	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Titanium				0.00030									0.02560	0.02380	<0.00030	0.000420
Tungsten				0.00010									<0.00010	<0.00010	<0.00010	<0.00010
Uranium	-	-	0.0010	0.00001	0.02	-	-	-	<0.0010	<0.0010	0.00135	0.00135	0.00051	0.00048	0.00212	0.00209
Vanadium	0.0009	0.001	-	0.00050	-	<0.001	<0.001	<0.001	-	-	-	-	0.00163	0.00149	<0.00050	<0.00050
Zinc	0.0010	0.010	0.003	0.0030	0.03	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zircounim				0.00030									0.00083	0.00076	<0.00030	<0.00030
Dissolved Metals and Non-Metals																
Aluminum	0.0040	0.0050	0.005			<0.005	<0.005	0.01	0.0290	0.0180	0.0068	0.0122	-	-	-	-
Arsenic	0.0050	0.001	0.0001			<0.001	<0.001	<0.001	<.0001	<.0001	<0.00010	<0.00010	-	-	-	-
Barium	0.00	0.01				<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-
Boron	0.050	0.010				<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-
Cadmium	0.0001	0.00010	0.00001			<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Calcium	0.050	1.0	0.05			16.00	16.00	21.00	9.65	9.46	14.10	14.20	-	-	-	-
Chromium	0.0010	0.001				<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-
Cobalt	0.0003	0.0002				<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-
Copper	0.0008	0.001	0.0002			<0.001	<0.001	<0.001	-	0.00033	0.00041	0.00043	-	-	-	-
Iron	0.020	0.030	0.01			<0.03	<0.03	<0.03	0.030	0.015	<0.010	0.014	-	-	-	-
Lead	0.0002	0.001	0.0001			<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-
Magnesium	0.0050	1.0	0.05			8.00	6.00	8.00	4.44	4.46	6.62	6.47	-	-	-	-
Manganese	0.0007	0.010	0.0005			<0.01	<0.01	<0.01	0.00102	0.00072	0.00064	0.00084	-	-	-	-
Mercury	-	-	0.000010			-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Molybdenum	0.0003	0.005	0.00001			<0.005	<0.005	<0.005	0.00006	0.00006	0.00012	0.00012	-	-	-	-
Nickel	0.0010	0.005	0.0001			<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-
Potassium	0.020	0.010	0.0005			0.52	0.26	0.55	0.361	0.348	0.465	0.463	-	-	-	-
Selenium	0.0050	0.001	0.05			<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-
Silver	0.0001	0.00010	0.0001			<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-
Sodium	0.050	0.050	0.50			0.64	0.28	0.60	<0.50	<0.50	0.62	0.62	-	-	-	-
Strontium	0.0010	0.001				0.01	0.01	0.02	-	-	-	-	-	-	-	-
Thallium	0.0002	-	0.00001			-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Tin	0.0010	0.010				<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-
Uranium	-	-	0.00001						0.00032	0.00032	0.00127	0.00127	-	-	-	-
Vanadium	0.0009	0.001				<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-
Zinc	0.0010	0.010	0.0010			<0.01	<0.01	<0.01	0.00210	<0.0010	<0.0010	0.0011	-	-	-	-

Notes:

Yellow highlight denotes exceedance to CCME guidelines or Baffinland's 2AM-MRY-1325 Water Licence

2006 dissolved oxygen values in mg/L; 2015 and 2016 dissolved oxygen values in % saturation

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-050 (CV099)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits [3 2010]	Dates													
	2005	2006	2015	2016		13-Jun-05	06-Aug-05	09-Sep-05	14-Jun-06	03-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16
In Situ Parameters												US	DS	US	DS	DS	US	DS	US
Temperature (^{o}C)	-	-	-		-	0.11	9.36	4.13	0.04	8.31	2.74	-	-	9.3	8.2	10.8	12.2	9.0	9.1
Specific Conductance (mS/cm)	-	-	-		-	0.104	0.220	0.308	0.112	0.254	0.305	0.112	0.111	0.337	0.338	-	-	0.347	0.353
Dissolved Oxygen	-	-	-		5.5-9.5	13.69	10.95	12.74	13.80	12.02	13.37	-	-	103.5	101.7	97.4	97.0	102.5	107.5
pH	-	-	-		6.5 - 9.0	7.54	8.31	8.07	8.17	8.36	8.55	8.27	8.28	8.55	8.53	7.97	7.93	8.24	8.30
Wetted Width (m)	-	-	-		-	-	-	-	ice	11	12	6	6	2	2	-	-		
Average Depth (m)	-	-	-		-	-	-	-	0.1	0.15	0.3	0.1	0.1	0.15	0.15	-	-		
Flow Rate (m^3/s)	-	-	-		-	-	-	-	-	0.82	1.88	-	-	-	-	-	-		
Physical Parameters																			
pH	-	-	0.01	0.01	6.5 - 9.0	-	-	-	7.68	8.14	8.13	8.13	8.13	8.37	8.36	8.09	8.08	8.42	8.46
Conductivity (uS/cm)	1	5	-	-	-	105	235	296	122	259	315	-	-	-	-	-	-	-	-
Turbidity (NTU)	0.1	0.1	0.10	0.10	-	0.84	0.23	<0.10	0.9	0.2	-	0.3	0.5	1.1	0.1	0.42	0.47	0.13	0.16
Hardness (mg/L $CaCO_3$)	0.5	1	10	10	-	54.2	128	177	62	144	162	81	80	157	156	59	60	185	187
TSS				2								<2.0	2	<2	<2	<2.0	<2.0	<2.0	<2.0
TDS	30	5	20	-	-	57	123	170	79	168	205	93	77	168	157	70	65	176	178
Dissolved Anions																			
Alkalinity (mg/L CaCO3)	2	5	10	10	-	52	134	156	61	141	163	80	81	161	160	60	61	176	179
Br^-	0.3	0.05	-	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-
Cl^-	0.2	1	0.50	0.50	-	1.1	0.6	1.9	<1	1	3	1	1.22	4.14	4.15	1.16	1.06	8.54	8.68
Fluoride												-	-	-	-	0.021	<0.020	0.030	0.029
SO_4^-	0.5	1	0.30	0.30	-	0.6	1.1	2.5	2.0	2.0	6.0	1	1.20	4.80	5.12	1.03	0.84	7.13	6.77
Nutrients																			
NH_3+NH_4 (mg/L N)	0.1	0.02	0.15	0.15	0.021 - 231(4)	0.3	0.2	0.6	0.09	0.04	<0.02	<0.15	<0.15	0.23	0.17	<0.15	<0.15	<0.15	0.16
NO_2^- (mg/L N)	0.06	0.005			0.06	<0.06	<0.06	<0.06	<0.005	<0.005	0.017	-	-						
NO_3^- (mg/L N)	0.05	0.10	0.02	0.02	2.9	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.020	<0.020	0.03	0.04	<0.020	<0.020	<0.020	<0.020
NO_2+NO_3 (mg/L N)	0.06	0.10			-	<0.06	<0.06	<0.06	<0.10	<0.10	<0.10	-	-						
Total Ammonia as N				0.02												<0.020	<0.020	<0.020	0.05
Total Phosphorus	0.02	0.01	0.003	0.003	-	<0.02	<0.02	<0.10	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	0.0034	0.0051	0.0037	0.0041	0.0137
Dissolved Phosphorus	0.02	-	-	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-
Organic Compounds																			
Phenols	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC	-	-	1.0			-	-	-	-	-	-	1.8	1.7	2.700	2.80	1.3	1.3	2.5	2.5
TOC	-	-	1.0			-	-	-	-	-	-	1.8	1.8	2.70	2.80	1.4	1.5	2.6	2.8
TKN	-	-	0.15			-	-	-	-	-	-	<0.15	0.23	0.23	0.17	<0.15	<0.15	<0.15	0.16
Chlorophyll-a	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																			
Aluminum	0.004	0.005	0.010	0.010	0.005 - 0.100(5)	0.026	0.005	<0.004	0.015	<0.005	<0.005	0.01	0.014	<0.010	<0.010	0.021	0.015	<0.010	<0.010
Antimony	0.0004	-	-	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	0.005	0.001	0.001	0.00010	0.0050	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00010	0.00011	<0.00010	<0.00010	0.00014	0.00014
Barium	0.001	0.01	-	0.00020	-	0.002	0.004	0.005	<0.01	<0.01	<0.01	-	-			0.00241	0.00253	0.00660	0.00680
Beryllium	0.005	-	-	0.00010	-	<0.005	<0.005	<0.005	-	-	-	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	0.0003	-	-	0.00005	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-			<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.05	0.01	-	0.010	-	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-			<0.010	<0.010	<0.010	<0.010
Cadmium	0.0001	0.0001	0.0001	0.000010	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000090	<0.000090	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium	0.05	1	0.5000	0.50	-	13.0	29.3	39.8	16	34	37	17.6	18	35.9	34.9	13.7	13.2	41.3	41.2
Cesium				0.000010												<0.000010	<0.000010	<0.000010	<0.000010
Chromium	0.001	0.001	-	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-				<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	0.0003	0.0002	-	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-				<0.00010	<0.00010	<0.00010	<0.00010
Copper	0.0008	0.001	0.001	0.001	0.002 - 0.004(6)	<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Iron	0.02	0.03	0.05	0.05	0.3	<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Lead	0.0002	0.001	0.001	0.00010	0.001 - 0.007(7)	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Lithium				0.001												<0.0010	<0.0010	0.002	0.002
Magnesium	0.005	1	0.5	0.1	-	5.29	13.2	18.7	6	15	17	8.0	7.96	19.00	18.40	6.04	6.63	19.90	20.50
Manganese	0.0007	0.01	0.001	0.001	-	0.0079	<0.0007	<0.0007	<0.01	<0.01	<0.01	<0.0010	<0.0010	<0.00050	<0.00050	0.00	<0.00050	<0.00050	<0.00050
Mercury	0.0001	0.0001	0.00001	0.00001	0.000026	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	0.0003	0.005	0.001	0.000050	0.073	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.000050	0.000	0.000

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-050 (CV099)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits [3] 2010	Dates													
	2005	2006	2015	2016		13-Jun-05	06-Aug-05	09-Sep-05	14-Jun-06	03-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16
Nickel	0.001	0.005	0.001	0.00050	0.025 - 0.150(8)	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus				0.050												<0.050	<0.050	<0.050	<0.050
Potassium	0.02	0.01	1.0	0.050	-	0.53	0.45	0.54	0.52	0.34	0.52	<1.0	<1.0	0.61	0.63	0.34	0.39	0.69	0.69
Rubidium				0.00020												0.00033	0.00036	0.00057	0.00061
Selenium	0.005	0.001	0.0004	0.0001	0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00040	<0.00040	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon				0.0500												0.501	0.471	0.709	0.945
Silver	0.0001	0.0001	-	0.00005	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-			<0.000050	<0.000050	<0.000050	<0.000050
Sodium	0.05	0.05	0.50	0.50	-	0.39	0.67	1.15	0.37	0.67	1.61	0.76	0.75	2.6400	2.5500	0.66	0.71	4.03	4.02
Strontium	0.001	0.001	-	0.0010	-	0.0068	0.0140	0.0198	0.010	0.018	0.022					0.007	0.007	0.024	0.024
Sulfur				0.50												0.590	<0.50	2.790	3.040
Tellurium				0.00020												<0.00020	<0.00020	<0.00020	<0.00020
Thallium	0.0002	-	0.0003	0.0000	0.0008	<0.0002	<0.0002	<0.0002	-	-	-	<0.00030	<0.00030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium				0.0001												<0.00010	<0.00010	<0.00010	<0.00010
Tin	0.001	0.01	-	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01					<0.00010	<0.00010	<0.00010	<0.00010
Titanium	0.003	-	-	0.00030	-	<0.003	<0.003	<0.003	-	-	-					0.00090	0.00070	<0.00030	0.00033
Tungsten				0.00010												<0.00010	<0.00010	<0.00010	<0.00010
Uranium			0.001	0.000010								<0.0010	<0.0010	0.000982	0.001040	0.000173	0.000137	0.001220	0.001170
Vanadium	0.0009	0.001	-	0.00050	-	<0.0009	<0.0009	<0.0009	<0.001	<0.001	0.001					<0.00050	<0.00050	<0.00050	<0.00050
Zinc	0.001	0.01	0.003	0.003	0.03	0.002	<0.001	<0.001	<0.01	<0.01	<0.01	<0.0030	0.0044	<0.0030	0.019300	0.004500	<0.0030	0.007000	<0.0030
Zirconium				0.00030												<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals and Non-Metals																			
Aluminum	0.004	0.005	0.005			0.004	<0.004	<0.004	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-
Antimony	0.0004	-	0.0001			<0.0004	<0.0004	<0.0004	-	-	-	-	-	-	-	-	-	-	-
Arsenic	0.005	0.001				<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	0.00011	0.00010	-	-	-	-
Barium	0.001	0.01				0.002	0.004	0.005	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-
Beryllium	0.005	-				<0.005	<0.005	<0.005	-	-	-	-	-	-	-	-	-	-	-
Bismuth	0.0003	-				<0.0003	<0.0003	<0.0003	-	-	-	-	-	-	-	-	-	-	-
Boron	0.05	0.01				<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-
Cadmium	0.0001	0.0001	0.00001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Calcium	0.05	1	0.0500			12.3	29.7	37.4	15	33	37	18.4	18.8	34.7	34.7	-	-	-	-
Chromium	0.001	0.001				<0.001	0.002	0.002	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-
Cobalt	0.0003	0.0002				<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-
Copper	0.0008	0.001	0.00020			<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	0.00030	0.00031	0.00050	0.00055	-	-	-	-
Iron	0.02	0.03	0.010			<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	<0.010	<0.010	<0.010	<0.010	-	-	-	-
Lead	0.0002	0.001	0.000050			<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-
Magnesium	0.005	1	0.05			5.67	13.3	17.3	6	15	17	8.6	7.9	17.1	17	-	-	-	-
Manganese	0.0007	0.01	0.00050			0.0060	<0.0007	<0.0007	<0.01	<0.01	<0.01	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-
Mercury												<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Molybdenum	0.0003	0.005	0.00001			<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.000010	<0.000010	0.000	0.000	-	-	-	-
Nickel	0.001	0.005	0.0001			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.000050	0.000059	<0.00050	<0.00050	-	-	-	-
Potassium	0.02	0.01	0.0005			0.52	0.44	0.52	0.52	0.34	0.53	<0.00050	<0.00050	0.616	0.631	-	-	-	-
Selenium	0.005	0.001	0.050			<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	0.386	0.360	<0.000050	<0.000050	-	-	-	-
Silver	0.0001	0.0001	0.00005			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000050	<0.000050	-	-	-	-	-	-
Sodium	0.05	0.05	0.50			0.42	0.67	1.10	0.34	0.68	1.61	0.76	0.73	2.41	2.39	-	-	-	-
Strontium	0.001	0.001				0.0070	0.0147	0.0188	0.009	0.019	0.023	-	-	-	-	-	-	-	-
Thallium	0.0002	-	0.00001			<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Tin	0.001	0.01				<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-
Titanium	0.003	-				<0.003	<0.003	<0.003	-	-	-	-	-	-	-	-	-	-	-
Uranium			0.00001									0.00023	0.00025	0.00091	0.00097	-	-	-	-
Vanadium	0.0009	0.001				<0.0009	0.0046	0.0046	<0.001	<0.001	0.001	-	-	-	-	-	-	-	-
Zinc	0.001	0.01	0.001			0.009	0.002	0.002	<0.01	<0.01	<0.01	0.0017	0.0044	<0.0010	0.0182	-	-	-	-

Notes:

Yellow highlight denotes exceedance to CCME guidelines or Baffinland's 2AM-MRY-1325 Water Licence

2005 and 2006 dissolved oxygen values in mg/L; 2015 and 2016 dissolved oxygen values in % saturation

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Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-053 (CV093)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3 2010]	Dates						
	2005	2006	2015	2016		14-Jun-06	03-Aug-06	08-Sep-06	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16
In Situ Parameters									US	DS	DS	US
Temperature (°C)	-	-	-		-	-0.08	9.96	5.77	5.5	5.9	11.3	5.6
Specific Conductance (mS/cm)	-	-	-		-	0.148	0.160	0.182	0.340	0.320	NA	NA
Dissolved Oxygen %	-	-	-		5.5-9.5	13.70	10.81	12.46	99.4	101.1	99.4	99.0
pH	-	-	-		6.5 - 9.0	8.32	8.15	8.24	8.42	8.43	8.02	7.99
Wetted Width (m)	-	-	-		-	20	33	28	2.5	2.5	-	-
Average Depth (m)	-	-	-		-	0.15	0.2	0.2	0.5	0.5	-	-
Flow Rate (m^3/s)	-	-	-		-	2	4.62	6.85	-	-	-	-
Physical Parameters												
pH	-	-	0.01		6.5 - 9.0	7.91	7.84	7.64	8.36	8.26	8.27	8.20
Conductivity (uS/cm)	1	5	-		-	161	165	190	-	-	-	-
Turbidity (NTU)	0.1	0.1	0.10		-	0.5	0.2	-	0.2	1.22	0.92	1.31
Hardness (mg/L $CaCO_3$)	0.5	1	10		-	85	86	95	152	158	99	100
TSS									<2	2	<2.0	4.4
TDS	30	5	13		-	105	107	123	147	159	115	105
Dissolved Anions												
Alkalinity (mg/L CaCO3)	2	5	10		-	80	85	93	155	163	103	99
Br^-	0.3	0.05	-		-	<0.05	<0.05	<0.05	-	-	-	-
Cl^-	0.2	1	0.50		-	<1	<1	<1	0.74	3.07	0.61	0.57
Fluoride											0.04	0.03
SO_4^-	0.5	1	0.30		-	3	2	7	2.66	3.90	1.22	1.24
Nutrients												
NH_3+NH_4 (mg/L N)	0.1	0.02	0.15		0.021 - 231(4)	0.04	<0.02	<0.02	0.23	<0.15	<0.15	<0.15
NO_2^- (mg/L N)	0.06	0.005			0.06	<0.005	<0.005	0.015				
NO_3^- (mg/L N)	0.05	0.10	0.020		2.9	<0.10	<0.10	<0.10	0.023	0.026	<0.020	0.023
NO_2+NO_3 (mg/L N)	0.06	0.10			-	<0.10	<0.10	<0.10				
Ammonia total as N											<0.020	<0.020
Total Phosphorus	0.02	0.01	0.0030		-	<0.01	<0.01	<0.01	<0.0030	0.0037	0.0216	0.0657
Dissolved Phosphorus	0.02	-	-		-	-	-	-	-	-	-	-
Organic Compounds												
Phenols	0.001	0.001	-		0.004	<0.001	<0.001	<0.001	-	-	-	-
DOC	-	-	1.0						1.8	2.4	<1.0	<1.0
TOC	-	-	1.0						1.8	2.1	1.2	<1.0
TKN	-	-	0.15						0.23	<0.15	<0.15	<0.15
Chlorophyll-a	-	-	-						-	-	-	-
Pheophytin-a	-	-	-						-	-	-	-
Total Metals and Non-Metals												
Aluminum	0.004	0.005	0.01	0.01	0.005 - 0.100(5)	<0.005	<0.005	0.007	0.018	0.012	0.025	0.139
Antimony	0.0004	-	-	0.0001	-	-	-	-	-	-	<0.00010	<0.00010
Arsenic	0.005	0.001	0.001	0.0001	0.0050	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010
Barium	0.001	0.01	-	0.00020	-	<0.01	<0.01	<0.01	-	-	0.0046	0.0043
Beryllium	0.005	-	-	0.0001	-	-	-	-	-	-	<0.00010	<0.00010
Bismuth	0.0003	-	-	0.00005	-	-	-	-	-	-	<0.000050	<0.000050
Boron	0.05	0.01	-	0.01	-	<0.01	<0.01	<0.01	-	-	<0.010	<0.010
Cadmium	0.0001	0.0001	0.0001	0.000010	0.000017	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010
Calcium	0.05	1	0.5	0.5	-	24	25	27	44.0	43.6	31.2	31.6
Cesium				0.00001							<0.000010	0.000018
Chromium	0.001	0.001	-	0.00050	-	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050
Cobalt	0.0003	0.0002	-	0.00010	-	<0.0002	<0.0002	<0.0002	-	-	<0.00010	<0.00010
Copper	0.0008	0.001	0.001	0.0010	0.002 - 0.004(6)	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010
Iron	0.02	0.03	0.05	0.050	0.3	<0.03	<0.03	<0.03	<0.050	<0.050	<0.050	0.179
Lead	0.0002	0.001	0.001	0.00010	0.001 - 0.007(7)	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010
Lithium				0.0010							<0.0010	<0.0010
Magnesium	0.005	1	0.5	0.05	-	6	5	6	11.8	13.8	5.0	5.2
Manganese	0.0007	0.01	0.001	0.00050	-	<0.01	<0.01	<0.01	<0.00050	<0.00050	0.00058	0.00362
Mercury	0.0001	0.0001	0.00001	0.000010	0.000026	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	0.0003	0.005	0.001	0.0001	0.073	<0.005	<0.005	<0.005	<0.00050	<0.00050	0.000093	0.000091
Nickel	0.001	0.005	0.001	0.0005	0.025 - 0.150(8)	<0.005	<0.005	<0.005	<0.0010	<0.0010	<0.00050	<0.00050
Phosphorus				0.050							<0.050	<0.050
Potassium	0.02	0.01	1.0	0.05	-	0.24	0.15	0.23	0.34	0.52	0.62	0.54
Rubidium				0.0002							0.00122	0.00107

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Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-053 (CV093)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3] 2010	Dates						
	2005	2006	2015	2016		14-Jun-06	03-Aug-06	08-Sep-06	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16
Selenium	0.005	0.001	0.0004	0.00005	0.001	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050
Silicon	0.0001	0.0001	-	0.05	0.0001	<0.0001	<0.0001	<0.0001	-	-	0.643	0.846
SIlver				0.000050					-	-	<0.000050	<0.000050
Sodium	0.05	0.05	0.50	0.50	-	0.34	0.23	0.58	0.6100	1.75	<0.50	<0.50
Strontium	0.001	0.001	-	0.001	-	0.019	0.018	0.022	-	-	0.0295	0.0284
Sulfur				0.50							0.74	<0.50
Tellurium				0.00020							<0.00020	<0.00020
Thallium	0.0002	-	0.0003	0.000010	0.0008	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010
Thorium				0.00010							<0.00010	<0.00010
Tin	0.001	0.01	-	0.00010	-	<0.01	<0.01	<0.01	-	-	<0.00010	<0.00010
Titanium	0.003	-	-	0.00030	-	-	-	-	-	-	0.00097	0.00745
Tungsten				0.00010							<0.00010	<0.00010
Uranium			0.0010	0.000010					0.000422	0.000590	0.000159	0.000159
Vanadium	0.0009	0.001	-	0.00050	-	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050
Zinc	0.001	0.01	0.003	0.0030	0.03	<0.01	<0.01	<0.01	<0.0030	0.0033	<0.0030	<0.0030
Zirconium				0.00030							<0.00030	<0.00030
Dissolved Metals and Non-Metals												
Aluminum	0.004	0.005	0.005			<0.005	<0.005	<0.005	<0.0050	0.0412		
Antimony	0.0004	-	0.0001			-	-	-				
Arsenic	0.005	0.001				<0.001	<0.001	<0.001	<0.00010	<0.00010		
Barium	0.001	0.01				<0.01	<0.01	<0.01				
Beryllium	0.005	-				-	-	-				
Bismuth	0.0003	-				-	-	-				
Boron	0.05	0.01				<0.01	<0.01	<0.01				
Cadmium	0.0001	0.0001	0.000010			<0.0001	<0.0001	<0.0001	<0.000010	<0.000010		
Calcium	0.05	1	0.0500			24	26	28	43	42		
Cesium												
Chromium	0.001	0.001				<0.001	<0.001	<0.001				
Cobalt	0.0003	0.0002				<0.0002	<0.0002	<0.0002				
Copper	0.0008	0.001	0.00020			<0.001	<0.001	<0.001	0.00024	0.00038		
Iron	0.02	0.03	0.010			<0.03	<0.03	<0.03	<0.010	0.03		
Lead	0.0002	0.001	0.000050			<0.001	<0.001	<0.001	<0.000050	<0.000050		
Lithium												
Magnesium	0.005	1	0.05			6	5	6	11	13		
Manganese	0.0007	0.01	0.0005			<0.01	<0.01	<0.01	<0.00050	0.000510		
Mercury									<0.000010	<0.000010		
Molybdenum	0.0003	0.005	0.00001			<0.005	<0.005	<0.005	0.000076	0.000118		
Nickel	0.001	0.005	0.000050			<0.005	<0.005	<0.005	<0.00050	<0.00050		
Phosphorus												
Potassium	0.02	0.01	0.001			0.24	0.15	0.25	0.344	0.538		
Rubidium												
Selenium	0.005	0.001	0.05			<0.001	<0.001	<0.001	<0.000050	<0.000050		
Silicon												
Silver	0.0001	0.0001	0.00005			<0.0001	<0.0001	<0.0001				
Sodium	0.05	0.05	0.50			0.32	0.24	0.40	0.60	1.61		
Strontium	0.001	0.001				0.018	0.019	0.022				
Thallium	0.0002	-	0.000010			-	-	-	<0.000010	<0.000010		
Tin	0.001	0.01				<0.01	<0.01	<0.01				
Titanium	0.003	-				-	-	-				
Uranium			0.00001						0.000414	0.000573		
Vanadium	0.0009	0.001				<0.001	<0.001	<0.001				
Zinc	0.001	0.01	0.0010			<0.01	<0.01	<0.01	<0.0010	0.0025		

Notes:

Yellow highlight denotes exceedance to CCME guidelines or Baffinland's 2AM-MRY-1325 Water Licence

NA denotes probable calibration error. Result not acceptable.

2006 dissolved oxygen values in mg/L; 2015 and 2016 dissolved oxygen values in % saturation

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-060 (CV078)

Parameters	Units	Method Detection Limit[1]		LOR		CCME Guideline Limits3 2010	Date											
		2005	2006	2015	2016		13-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	02-Aug-06	08-Sep-06	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16
In Situ Parameters													US	DS	DS	US	DS	US
Temperature	ºC	-	-	-			0.22	9.28	4.02	-0.06	13.05	3.95	9.6	9.3	8.16	9.36	9.8	10
Specific Conductance	mS/cm	-	-	-		-	0.079	0.222	0.284	0.097	0.237	0.267	0.314	0.315	NA	NA	0.299	0.297
Dissolved Oxygen	mg/L	-	-	-		-	13.48	10.95	12.72	14.17	11.43	12.55	-	-	-	-	-	-
Dissolved Oxygen	%			-		5.5-9.5							102.7	102.3	100.4	100.1	102.5	103.8
pH	pH units	-	-	-		6.5 - 9.0	7.36	8.30	7.96	8.22	8.26	8.36	8.53	8.48	7.81	7.93	8.24	8.25
Wetted Width	m	-	-	-		-	-	-	-	ice	9	9	3	3	-	-		
Average Depth	m	-	-	-		-	-	-	-	0.15	0.25	0.2	0.1	0.1	-	-		
Flow Rate	m^3/s	-	-	-		-	-	-	-	-	0.74	0.96	-	-	-	-		
Physical Parameters																		
pH	pH units	-	-	0.01	0.01	6.5 - 9.0	-	-	-	7.56	8.10	8.10	8.16	8.32	8.09	8.09	8.42	8.42
Conductivity	µS/cm	1	5	-	-		83	234	269	104	244	277	-	-	-	-	-	-
Turbidity	NTU	0.1	0.1	0.10	0.10		0.40	<0.10	<0.10	0.5	<0.10	-	1.45	0.24	0.26	0.17	0.13	0.14
Hardness	mg/L as $CaCO_3$	0.5	1	10	10		41.0	124	160	52	137	141	156	152	60	59	165	163
TSS	mg/L	30	5	2.0									2.4	<2.0	<2.0	<2.0	<2.0	<2.0
TDS	mg/L			-	20		63	123	120	68	159	180	159 *	143 *	65	70	152	148
Dissolved Anions																		
Alkalinity	mg/L as $CaCO_3$	2	5	10	10		40	120	141	51	132	146	158	152	61	64	161	158
Br^-	mg/L	0.3	0.05	-	-		<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-
Cl^-	mg/L	0.2	1	0.50	0.50		0.9	0.2	0.6	<1	<1	<1	3.08	0.79	<0.50	<0.50	1.19	1.19
Fluoride	mg/L				0.020										<0.020	<0.020	0.023	0.024
SO_4^-	mg/L	0.5	1	0.30	0.300		0.6	0.8	1.9	2	1	5	3.84	2.68	<0.30	0.31	3.37	3.35
Nutrients																		
NH_3+NH_4	mg/L N	0.1	0.02	0.15	0.15	0.021 - 231(4)	0.2	0.6	0.8	<0.02	<0.02	<0.02	0.24	0.25	<0.15	<0.15	<0.15	<0.15
NO_2^-	mg/L N	0.06	0.005			0.06	<0.06	<0.06	<0.06	<0.005	<0.005	0.018						
NO_3^-	mg/L N	0.05	0.10	0.02	0.02	2.9	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	0.030	0.026	<0.020	<0.020	<0.020	<0.020
NO_2+NO_3	mg/L N	0.06	0.10				<0.06	<0.06	<0.06	<0.10	<0.10	<0.10						
Ammonia total as N	mg/L			0.020											0.021	<0.020	0.027	0.041
Total Phosphorus	mg/L	0.02	0.01	0.0030	0.0030		<0.02	<0.02	<0.10	<0.01	<0.01	<0.01	0.004	<0.0030	0.0193	0.0282	0.0100	0.0139
Dissolved Phosphorus	mg/L	0.02	-	-			<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-
Organic Compounds																		
Phenols	mg/L	0.001	0.001			0.004	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-
DOC	mg/L			1.00	0.5								2.4	1.9	1.0	<1.0	1.5	1.5
TOC	mg/L			1.00	0.5								2.2	1.8	1.1	1.0	1.6	1.6
TKN	mg/L			0.15	0.1								0.24	0.25	<0.15	<0.15	<0.15	<0.15
Chlorophyll-a	mg/m3				-								-	-	-	-	-	-
Pheophytin-a	mg/m3				-								-	-	-	-	-	-
Total Metals and Non-Metals																		
Aluminum	mg/L	0.004	0.005	0.010	0.010	0.005 - 0.100(5)	0.006	<0.004	<0.004	0.006	<0.005	<0.005	0.059	0.016	0.011	0.016	<0.010	<0.010
Antimony	mg/L	0.0004	-	-	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.005	0.001	0.0010	0.00010	0.0050	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010
Barium	mg/L	0.001	0.01	-	0.00020	-	<0.001	0.002	0.003	<0.01	<0.01	<0.01	-	-	0.00166	0.00190	0.00389	0.00385
Beryllium	mg/L	0.005	-	-	0.00010	-	<0.005	<0.005	<0.005	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	0.0003	-	-	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.05	0.01	-	0.010	-	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0001	0.0001	0.00010	0.000010	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium	mg/L	0.05	1	0.5	0.5	-	13.2	35.5	44.7	17	41	41	45	43.1	17.4	16.8	45.9	45.6
Cesium					0.000010										<0.000010	<0.000010	<0.000010	<0.000010
Chromium	mg/L	0.001	0.001	-	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.0003	0.0002	-	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.0008	0.001	0.0010	0.0010	0.002 - 0.004(6)	<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Iron	mg/L	0.02	0.03	0.050	0.050	0.3	<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	0.053	<0.050	<0.050	<0.050	<0.050	<0.050
Lead	mg/L	0.0002	0.001	0.0005	0.00010	0.001 - 0.007(7)	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Lithium	mg/L			0.5	0.0010	-							-	-	<0.0010	<0.0010	0.0015	0.0016
Magnesium	mg/L	0.005	1	0.001	0.05	-	1.91	8.74	11.7	3	9	11	14.0	11.7	3.94	4.03	12.20	11.90
Manganese	mg/L	0.0007	0.01	0.000010	0.00050		0.0016	<0.0007	<0.0007	<0.01	<0.01	<0.01	0.000850	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Mercury	mg/L	0.0001	0.0001	0.00050	0.000010	0.000026	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	mg/L	0.0003	0.005	0.001	0.000050	0.073	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.000050	<0.000050	0.000093	0.000091
Nickel	mg/L	0.001	0.005	0.0010	0.00050	0.025 - 0.150(8)	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus					0.050										<0.050	<0.050	<0.050	<0.050

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Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-060 (CV078)

Parameters	Units	Method Detection Limit[1]		LOR		CCME Guideline Limits3 2010	Date											
		2005	2006	2015	2016		13-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	02-Aug-06	08-Sep-06	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16
Potassium	mg/L	0.02	0.01	0.050	0.050	-	0.26	0.26	0.27	0.22	0.28	0.30	0.508	0.355	0.210	0.216	0.344	0.355
Rubidium					0.00020										<0.00020	0.00022	0.00032	0.00034
Selenium	mg/L	0.005	0.001	0.000050	0.000050	0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon	mg/L			-	0.05								-	-	0.368	0.385	0.789	0.749
Silver	mg/L	0.0001	0.0001	-	0.000050	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	mg/L	0.05	0.05	0.50	0.50	0.0008	0.31	0.27	0.36	0.31	0.31	0.47	1.710	0.61	<0.50	<0.50	0.72	0.70
Strontium	mg/L	0.001	0.001	-	0.0010	-	0.0098	0.0226	0.0293	0.013	0.029	0.030	-	-	0.0123	0.0121	0.0350	0.0337
Sulfur					0.50										<0.50	<0.50	1.52	1.46
Tellurium					0.0002										<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.0002	-	0.00010	0.000010	0.0008	<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium					0.00010										<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	0.001	0.01	-	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.003	-	-	0.00030		<0.003	<0.003	<0.003	-	-	-	-	-	0.00060	0.00083	<0.00030	0.00032
Tungstun					0.00010										<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L			0.0010	0.000010								0.000577	0.000403	0.000072	0.000073	0.000468	0.000458
Vanadium	mg/L	0.0009	0.001	-	0.00050		<0.0009	<0.0009	<0.0009	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.001	0.01	0.0030	0.0030	0.03	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium					0.00030										<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals and Non-Metals																		
Aluminum	mg/L	0.004	0.005	0.0050		0.005	<0.004	<0.004	<0.004	<0.005	<0.005	<0.005	<0.0050	<0.0050	-	-	-	-
Antimony	mg/L	0.0004	-	-			<0.0004	<0.0004	<0.0004	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	0.005	0.001	0.00010		0.0001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	-	-	-	-
Barium	mg/L	0.001	0.01	-			<0.001	0.002	0.003	<0.01	<0.01	<0.01	-	-	-	-	-	-
Beryllium	mg/L	0.005	-	-			<0.005	<0.005	<0.005	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	0.0003	-	-			<0.0003	<0.0003	<0.0003	-	-	-	-	-	-	-	-	-
Boron	mg/L	0.05	0.01	-			<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-
Cadmium	mg/L	0.0001	0.0001	0.000010			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	-	-	-	-
Calcium	mg/L	0.05	1	0.05		0.00001	13.1	37.5	42.4	16	40	40	41.3	42.8	-	-	-	-
Chromium	mg/L	0.001	0.001	-		0.05	<0.001	0.002	0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-
Cobalt	mg/L	0.0003	0.0002	-			<0.0003	0.0004	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-
Copper	mg/L	0.0008	0.001	0.00020			<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	0.00034	0.00024	-	-	-	-
Iron	mg/L	0.02	0.03	0.010		0.0002	<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	<0.010	<0.010	-	-	-	-
Lead	mg/L	0.0002	0.001	0.000050		0.01	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-
Lithium	mg/L			0.05		-							-	-	-	-	-	-
Magnesium	mg/L	0.005	1	0.0005		0.05	2.09	9.19	11.0	3	9	10	12.80	10.9	-	-	-	-
Manganese	mg/L	0.0007	0.01	-		0.0005	0.0013	<0.0007	<0.0007	<0.01	<0.01	<0.01	<0.00050	<0.00050	-	-	-	-
Mercury	mg/L			0.000010		0.00001							<0.000010	<0.000010	-	-	-	-
Molybdenum	mg/L	0.0003	0.005	0.000050		0.00005	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	0.000125	0.000086	-	-	-	-
Nickel	mg/L	0.001	0.005	0.00050		0.0005	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.00050	<0.00050	-	-	-	-
Potassium	mg/L	0.02	0.01	0.050		0.05	0.26	0.28	0.26	0.20	0.27	0.28	0.488	0.361	-	-	-	-
Selenium	mg/L	0.005	0.001	0.00005		0.00005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-
Silicon	mg/L			-									-	-	-	-	-	-
Silver	mg/L	0.0001	0.0001	-			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	1.61	0.61	-	-	-	-
Sodium	mg/L	0.05	0.05	-		0.5	0.30	0.28	0.34	0.30	0.30	0.46	-	-	-	-	-	-
Strontium	mg/L	0.001	0.001				0.0099	0.0247	0.0281	0.012	0.028	0.030	-	-	-	-	-	-
Thallium	mg/L	0.0002	-	0.00010		0.00001	<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	-	-	-	-
Tin	mg/L	0.001	0.01	-			<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	-	-
Titanium	mg/L	0.003	-	-			<0.003	<0.003	<0.003	-	-	-	-	-	-	-	-	-
Uranium	mg/L			0.000010		0.00001							0.000549	0.000409	-	-	-	-
Vanadium	mg/L	0.0009	0.001	-			<0.0009	0.0043	0.0042	<0.001	<0.001	0.002	-	-	-	-	-	-
Zinc	mg/L	0.001	0.01	0.0010		0.001	<0.001	0.001	0.002	<0.01	<0.01	<0.01	<0.0010	0.00260	-	-	-	-

Notes:

Yellow highlight denotes exceedance to CCME guidelines or Baffinland's 2AM-MRY-1325 Water Licence

NA denotes problem with field equipment calibration, result not acceptable.

2005 and 2006 dissolved oxygen values in mg/L; 2015 and 2016 dissolved oxygen values in % saturation

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITEN1-070 (BG50)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3 2010]	Dates													
	2005	2006	2015	2016		07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	02-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	11-Aug-15	11-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16
In Situ Parameters												US	DS	US	DS	DS	US	DS	US
Temperature (^{o}C)	-	-	-		-	0.26	9.75	6.05	-0.05	13.74	6.53	-	-	11.4	11.3	10.4	7.2	11.5	11.3
Specific Conductance (mS/cm)	-	-	-		-	0.067	0.139	0.145	0.112	0.137	0.152	0.130	0.084	0.183	0.180	NA	NA	0.175	0.175
Dissolved Oxygen	-	-	-		5.5-9.5	13.06	10.71	11.89	13.58	10.32	-	-	-	101.5	101.9	98.5	99.4	101.4	100.5
pH	-	-	-		6.5 - 9.0	7.58	8.03	7.70	8.02	8.10	8.16	8.20	8.17	8.42	8.42	6.21	7.47	8.22	8.15
Wetted Width (m)	-	-	-		-	-	-	-	52	42	38	-	-	6	6	-	-		
Average Depth (m)	-	-	-		-	-	-	-	-	0.3	0.3	-	-	0.2	0.2	-	-		
Flow Rate (m^3/s)	-	-	-		-	-	-	-	-	4.09	-	-	-	-	-	-	-		
Physical Parameters																			
pH	-	-	0.01	0.01	6.5 - 9.0	-	-	-	7.70	7.61	7.64	7.98	7.99	8.20	8.17	7.86	7.94	8.32	8.28
Conductivity (uS/cm)	1	5	-	-	-	72	149	143	124	140	171	-	-	-	-	-	-	-	-
Turbidity (NTU)	0.1	0.1	0.10	0.10	-	0.33	0.25	0.16	0.5	0.3	-	0.29	0.28	0.2	0.2	0.60	0.46	0.28	0.26
Hardness (mg/L $CaCO_3$)	0.5	1	10	10	-	32.4	79.5	82.0	61	75	80	63	62	80	81	48	48	85	93
TSS				2.0								<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0
TDS	30	5	20	-	-	54	74	86	81	91	111	70	73	86 *	84 *	60	65	83	84
Dissolved Anions																			
Alkalinity (mg/L CaCO3)	2	5	10	10	-	33	74	71	62	74	87	63	63	82	80	47	50	84	89
Br^-	0.3	0.05	-	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-
Cl^-	0.2	1	0.50	0.50	-	0.9	0.8	0.9	<1	<1	2	1.29	1.30	2.06	2.20	1.26	1.26	1.89	1.88
Fluoride																<0.020	<0.020	0.02	0.03
SO_4^-	0.5	1	0.30	0.30	-	0.7	0.5	0.6	2	<1	3	0.82	1.03	1.55	2.28	0.65	0.62	1.25	1.21
Nutrients																			
NH_3+NH_4 (mg/L N)	0.1	0.02	0.15	0.15	0.021 - 231(4)	0.2	0.1	<0.10	0.04	0.11	<0.02	<0.15	<0.15	0.28	0.22	<0.15	<0.15	0.20	<0.15
NO_2^- (mg/L N)	0.06	0.005			0.06	<0.06	<0.06	<0.06	<0.005	<0.005	0.013								
NO_3^- (mg/L N)	0.05	0.10	0.02	0.020	2.9	0.06	<0.05	<0.05	<0.10	<0.10	<0.10	<0.020	0.035	<0.020	0.052	<0.020	<0.020	<0.020	<0.020
NO_2+NO_3 (mg/L N)	0.06	0.10			-	0.06	<0.06	<0.06	<0.10	<0.10	<0.10								
Ammonia total as N				0.020												<0.020	0.054	0.061	<0.020
Total Phosphorus	0.02	0.01	0.003	0.0030	-	<0.02	<0.02	<0.10	<0.01	<0.01	<0.01	0.0043	0.0058	0.0040	0.0038	0.0044	0.0032	0.0231	0.0088
Dissolved Phosphorus	0.02	-	-	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-
Organic Compounds																			
Phenols	0.001	0.001			0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-				
DOC			0.5	0.5								2.1	2.1	2.5	2.6	2.1	1.9	2.1	2.3
TOC			0.5	0.5								2.1	1.9	2.7	2.6	2.3	2.2	2.5	2.2
TKN			0.1	0.1								<0.15	<0.15	0.28	0.22	<0.15	<0.15	0.20	<0.15
Chlorophyll-a												-	-	-	-	-	-	-	-
Pheophytin-a												-	-	-	-	-	-	-	-
Total Metals and Non-Metals																			
Aluminum	0.004	0.005	0.010	0.010	0.005 - 0.100(5)	0.008	<0.004	<0.004	<0.005	<0.005	0.006	<0.010	<0.010	<0.010	<0.010	0.018	0.014	<0.010	<0.010
Antimony	0.0004	-	-	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	0.005	0.001	0.0010	0.00010	0.0050	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	0.00012
Barium	0.001	0.01	-	0.00020	-	0.001	0.004	0.004	<0.01	<0.01	<0.01	-	-			0.00347	0.00340	0.00545	0.00569
Beryllium	0.005	-	-	0.00010	-	<0.005	<0.005	<0.005	-	-	-	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	0.0003	-	-	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-			<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.05	0.01	-	0.010	-	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-			<0.010	<0.010	<0.010	<0.010
Cadmium	0.0001	0.0001	0.00010	0.000010	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000090	<0.000090	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium	0.05	1	0.5	0.50	-	8.86	18.3	18.5	14	17	19	14.1	13.9	20.2	19.2	10.5	10.6	19.0	21.2
Cesium				0.000010												<0.000010	<0.000010	<0.000010	<0.000010
Chromium	0.001	0.001	-	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-			0.00080	<0.00050	<0.00050	<0.00050
Cobalt	0.0003	0.0002	-	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Copper	0.0008	0.001	0.0010	0.0010	0.002 - 0.004(6)	<0.0008	0.0009	<0.0008	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Iron	0.02	0.03	0.050	0.050	0.3	<0.02	<0.02	<0.02	<0.03	<0.03	<0.03	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Lead	0.0002	0.001	0.00050	0.00010	0.001 - 0.007(7)	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Lithium				0.0010												<0.0010	<0.0010	0.0012	0.0013
Magnesium	0.005	1	0.50	0.05	-	2.49	8.23	8.71	7	8	8	6.28	6.36	9.52	9.21	5.19	5.14	9.19	9.72
Manganese	0.0007	0.01	0.0010	0.00050	-	0.0071	0.0010	0.0009	<0.01	<0.01	<0.01	<0.0010	<0.0010	<0.00050	0.00118	0.00154	0.00144	0.00101	0.00106
Mercury	0.0001	0.0001	0.000010	0.000010	0.000026	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	0.0003	0.005	0.00050	0.000050	0.073	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	0.000063	0.000054	0.000067	0.000065
Nickel	0.001	0.005	0.00100	0.00050	0.025 - 0.150(8)	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.0010	<0.0010	<0.0010	<0.0010	0.00071	<0.00050	<0.00050	<0.00050

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITEN1-070 (BG50)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3] 2010	Dates													
	2005	2006	2015	2016		07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	02-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	11-Aug-15	11-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16
Phosphorus				0.050												<0.050	<0.050	<0.050	<0.050
Potassium	0.02	0.01	1.0	0.05	-	0.49	0.47	0.50	0.62	0.45	0.51	<1.0	<1.0	0.67	0.67	0.48	0.48	0.64	0.68
Rubidium				0.00020												0.00053	0.00051	0.00075	0.00073
Selenium	0.005	0.001	0.00040	0.000050	0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00040	<0.00040	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon				0.05												0.400	0.393	0.545	0.567
Silver	0.0001	0.0001	-	0.000050	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-			<0.000050	<0.000050	<0.000050	<0.000050
Sodium	0.05	0.05	0.50	0.50	-	0.30	0.52	0.54	0.50	0.53	0.94	0.89	0.91	1.57	1.56	0.85	0.84	1.41	1.52
Sulfur				0.001												0.0073	0.0070	0.0128	0.0134
Tellurium				0.50												<0.50	<0.50	0.59	0.66
Strontium	0.001	0.001	-	0.00020	-	0.0057	0.0094	0.0098	0.009	0.010	0.014	-	-			<0.00020	<0.00020	<0.00020	<0.00020
Thallium	0.0002	-	0.00030	0.000010	0.0008	<0.0002	<0.0002	<0.0002	-	-	-	<0.00030	<0.00030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium				0.00010												<0.00010	<0.00010	<0.00010	<0.00010
Tin	0.001	0.01	-	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Titanium	0.003	-	-	0.00030	-	<0.003	<0.003	<0.003	-	-	-	-	-			0.00076	0.00049	0.00038	<0.00030
Tungsten				0.00010												<0.00010	<0.00010	<0.00010	<0.00010
Uranium			0.001	0.000010								<0.0010	<0.0010	0.000460	0.000435	0.00022	0.00021	0.00042	0.00045
Vanadium	0.0009	0.001	-	0.00050	-	<0.0009	<0.0009	<0.0009	<0.001	<0.001	<0.001	-	-			<0.00050	<0.00050	<0.00050	<0.00050
Zinc	0.001	0.01	0.0030	0.0030	0.03	0.0010	<0.001	<0.001	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	0.00380	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium				0.00030												<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals and Non-Metals																			
Aluminum	0.004	0.005	0.005			<0.004	<0.004	<0.004	<0.005	<0.005	<0.005	0.01	<0.0050	<0.0050	<0.0050	-	-	-	-
Antimony	0.0004	-	0.0001			<0.0004	<0.0004	<0.0004	-	-	-	-	-			-	-	-	-
Arsenic	0.005	0.001				<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-	-
Barium	0.001	0.01				0.001	0.004	0.004	<0.01	<0.01	<0.01	-	-			-	-	-	-
Beryllium	0.005	-				<0.005	<0.005	<0.005	-	-	-	-	-			-	-	-	-
Bismuth	0.0003	-				<0.0003	<0.0003	<0.0003	-	-	-	-	-			-	-	-	-
Boron	0.05	0.01				<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-			-	-	-	-
Cadmium	0.0001	0.0001	0.000010			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000011	<0.000010	<0.000010	<0.000010	-	-	-	-
Calcium	0.05	1	0.05			9.62	18.3	17.2	13	17	19	14.9	13.9	17.9	18.1	-	-	-	-
Chromium	0.001	0.001				<0.001	0.001	<0.001	<0.001	<0.001	<0.001	-	-			-	-	-	-
Cobalt	0.0003	0.0002				<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-			-	-	-	-
Copper	0.0008	0.001	0.0002			<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	0.0010	0.0004	0.0007	0.0005	-	-	-	-
Iron	0.02	0.03	0.010			<0.02	0.02	<0.02	<0.03	<0.03	<0.03	0.0520	<0.010	0.0170	<0.010	-	-	-	-
Lead	0.0002	0.001	0.00005			<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	0.00	<0.000050	<0.000050	<0.000050	-	-	-	-
Magnesium	0.005	1	0.05			2.67	8.24	7.80	7	8	8	6.24	6.64	8.57	8.60	-	-	-	-
Manganese	0.0007	0.01	0.0005			0.0068	<0.0007	<0.0007	<0.01	<0.01	<0.01	0.00271	<0.00050	0.00105	<0.00050	-	-	-	-
Mercury												<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Molybdenum	0.0003	0.005	0.000010			<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	0.000080	0.000055	0.000067	0.000072	-	-	-	-
Nickel	0.001	0.005	0.0001			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-
Potassium	0.02	0.01	0.00050			0.52	0.48	0.49	0.61	0.46	0.49	0.59	0.58	0.67	0.69	-	-	-	-
Selenium	0.005	0.001	0.050			<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-
Silver	0.0001	0.0001	0.00005			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-			-	-	-	-
Sodium	0.05	0.05	0.50			0.34	0.52	0.51	0.49	0.52	0.90	0.97	0.91	1.42	1.44	-	-	-	-
Strontium	0.001	0.001				0.0061	0.0100	0.0092	0.008	0.010	0.014	-	-			-	-	-	-
Thallium	0.0002	-	0.000010			<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Tin	0.001	0.01				<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-			-	-	-	-
Titanium	0.003	-				<0.003	<0.003	<0.003	-	-	-	-	-			-	-	-	-
Uranium			0.000010									0.00024	0.00031	0.00040	0.00041	-	-	-	-
Vanadium	0.0009	0.001				<0.0009	0.0027	0.0022	<0.001	<0.001	<0.001	-	-			-	-	-	-
Zinc	0.001	0.01	0.001			0.003	0.002	0.009	<0.01	<0.01	<0.01	0.00750	0.00130	<0.0010	0.00390	-	-	-	-

Notes:

Yellow highlight denotes exceedance to CCME guidelines or Baffinland's 2AM-MRY-1325 Water Licence

NA denotes problem with field equipment calibration, result not acceptable.

2006 dissolved oxygen values in mg/L; 2015 and 2016 dissolved oxygen values in % saturation

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-080 (CV040)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3 2010]	Dates														
	2005	2006	2015	2016		13-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	13-Jun-06	02-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	11-Aug-15	11-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-15
In Situ Parameters													US	DS	US	DS	DS	US	DS	US
Temperature (^oC)	-	-	-		-	0.07	10.80	4.78	-0.1	-0.1	14.96	4.91	-	-	12.8	12.7	15.7	16.0		11.1
Specific Conductance (mS/cm)	-	-	-		-	0.047	0.243	0.318	0.084	0.084	0.264	0.306	0.130	0.125	0.387	0.390	0.151	0.151		0.391
Dissolved Oxygen	-	-	-		5.5-9.5	13.48	10.39	12.74	13.65	13.65	10.46	-	-	-	101.7	102.3	99.8	103.6		99.8
pH	-	-	-		6.5 - 9.0	6.99	8.39	8.05	7.97	7.97	8.37	8.50	8.32	8.16	8.61	8.65	8.19	8.23		8.36
Wetted Width (m)	-	-	-		-	-	-	-	ice		3	4	-	-	7	7	-	-		
Average Depth (m)	-	-	-		-	-	-	-	-	-	0.25	0.2	-	-	0.2	0.2	-	-		
Flow Rate (m^3/s)	-	-	-		-	-	-	-	-	-	0.28	-	-	-	0	0	-	-		
Physical Parameters																				
pH	-	-	0.01	0.01	6.5 - 9.0	-	-	-	7.40	7.47	8.22	8.18	8.18	8.19	8.53	8.50	8.10	8.19	8.47	8.51
Conductivity (uS/cm)	1	5	-	-	-	54	257	303	92	93	273	321	-	-	-	-	-	-	-	-
Turbidity (NTU)	0.1	0.1	0.10	0.10	-	0.37	0.13	<0.10	0.6	0.5	0.2	-	0.44	0.54	0.19	0.15	1.48	1.05	0.28	0.33
Hardness (mg/L $CaCO_3$)	0.5	1	10	10	-	25.1	138	178	48	48	153	159	95	94	168	169	68	69	193	202
TSS				2									<2.0	<2.0	<2.0	<2.0	2	<2.0	<2.0	<2.0
TDS	30	5	20	-	-	46	126	200	60	61	177	209	77	90	178 *	170 *	65	65	208	201
Dissolved Anions																				
Alkalinity (mg/L CaCO3)	2	5	10	10	-	24	130	167	45	45	147	167	112	99	175	177	68	75	187	191
Br^-	0.3	0.05	-	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	<0.05	-	-	-		-	-	-	-
Cl^-	0.2	1	0.50	0.50	-	0.9	0.7	2.4	<1	<1	1	5	2	2	8	9	1.81	1.84	13.5	13.8
Fluoride																	<0.020	<0.020	0.026	0.027
SO_4^-	0.5	1	0.30	0.30	-	0.6	0.8	2.1	2	2	<1	4.00	1.58	1.47	4.81	5.36	0.76	0.84	6.03	6.52
Nutrients																				
NH_3+NH_4 (mg/L N)	0.1	0.02	0.15	0.15	0.021 - 231(4)	0.2	**0.5**	0.6	0.05	0.09	0.04	<0.02	0.17	<0.15	0.37	0.28	<0.15	<0.15	0.24	0.17
NO_2^- (mg/L N)	0.06	0.005			0.06	<0.06	<0.06	<0.06	<0.005	<0.005	<0.005	0.015	-		-	-				
NO_3^- (mg/L N)	0.05	0.10	0.020	0.020	2.9	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
NO_2+NO_3 (mg/L N)	0.06	0.10			-	<0.06	<0.06	<0.06	<0.10	<0.10	<0.10	<0.10			-	-			<0.020	0.085
Ammonia total as N				0.020													<0.020	<0.020		
Total Phosphorus	0.02	0.01	0.0030	0.0030	-	0.030	<0.02	<0.10	<0.01	<0.01	<0.01	<0.01	0.0040	0.0032	<0.0030	<0.0030	0.0067	0.0038	0.0048	0.0034
Dissolved Phosphorus	0.02	-	-	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-	-
Organic Compounds																				
Phenols	0.001	0.001			0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-		
DOC	-	-	0.5	0.5	-	-	-	-	-	-	-	-	2.2	2.2	3.4	3.5	1.6	1.4	3.2	3.0
TOC	-	-	0.5	0.5	-	-	-	-	-	-	-	-	2.4	2.5	3.6	3.5	1.9	2.1	3.6	3.3
TKN	-	-	0.1	0.1	-	-	-	-	-	-	-	-	0.17	<0.15	0.37	0.28	<0.15	<0.15	0.24	0.17
Chlorophyll-a	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-	-	-
Pheophytin-a	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-
Total Metals and Non-Metals																				
Aluminum	0.004	0.005	0.010	0.010	0.005 - 0.100(5)	0.005	<0.004	<0.004	0.006	0.005	<0.005	<0.005	0.019	0.025	0.011	<0.010	0.096	0.042	0.024	0.020
Antimony	0.0004	-	-	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	0.005	0.001	0.0010	0.00010	0.0050	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00010	<0.00010	<0.00010	<0.00010	0.00014	0.00011
Barium	0.001	0.01	-	0.00020	-	0.001	0.006	0.007	<0.01	<0.01	<0.01	<0.01	-	-			0.0055	0.0050	0.0119	0.0118
Beryllium	0.005	-	-	0.00010	-	<0.005	<0.005	<0.005	-	-	-	-	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	0.0003	-	-	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	-			<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.05	0.01	-	0.010	-	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-			<0.010	<0.010	<0.010	<0.010
Cadmium	0.0001	0.0001	0.00010	0.000010	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium	0.05	1	0.5	0.5	-	6.07	33.9	42.9	11	11	38	40	-	-	42.3	40.5	16.9	16.8	44.7	46.1
Cesium				0.000010													0.000012	<0.000010	<0.000010	<0.000010
Chromium	0.001	0.001	-	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-			<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	0.0003	0.0002	-	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	<0.0002	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Copper	0.0008	0.001	0.001	0.0010	0.002 - 0.004(6)	<0.0008	<0.0008	0.0008	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	0.0025	<0.0010	<0.0010	<0.0010	<0.0010
Iron	0.02	0.03	0.05	0.050	0.3	<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	<0.03	<0.050	<0.050	<0.050	<0.050	0.11	<0.050	<0.050	<0.050
Lead	0.0002	0.001	0.00010	0.00010	0.001 - 0.007(7)	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.001	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Lithium				0.0010													<0.0010	<0.0010	0.0022	0.0023
Magnesium	0.005	1	0.5	0.05	-	2.41	12.9	17.2	5	5	14	15	9.7	9.1	19.6	19.6	6.2	6.6	19.8	21.1
Manganese	0.0007	0.01	0.0010	0.00050	-	0.0029	<0.0007	<0.0007	<0.01	<0.01	<0.01	<0.01	<0.0010	<0.0010	<0.00050	0.00187	0.00217	0.00082	0.00172	0.00115
Mercury	0.0001	0.0001	0.000010	0.000010	0.000026	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	0.0003	0.005	0.00050	0.000050	0.073	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	0.000070	0.000073	0.000203	0.000224
Nickel	0.001	0.005	0.0010	0.00050	0.025 - 0.150(8)	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus				0.050													<0.050	<0.050	<0.050	<0.050
Potassium	0.02	0.01	1.0	0.05	-	0.39	0.69	0.78	0.60	0.60	0.70	0.78	<1.0	<1.0	1.23	1.23	0.75	0.71	1.31	1.34
Rubidium				0.00020													0.00127	0.00097	0.00156	0.00133
Selenium	0.005	0.001	0.00040	0.000050	0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.00040	<0.00040	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon				0.050													0.731	0.710	1.380	1.410
Silver	0.0001	0.0001	-	0.000050	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-			<0.000050	<0.000050	<0.000050	<0.000050
Sodium	0.05	0.05	0.50	0.50	-	0.31	1.20	2.04	0.41	0.42	1.42	3.45	2.52	2.30	7.72	7.27	1.54	1.69	8.73	9.23
Strontium	0.001	0.001	-	0.0010	-	0.0027	0.0187	0.0235	0.005	0.005	0.023	0.027	-	-			0.0101	0.0102	0.0308	0.0295
Sulfur				0.50													<0.50	0.55	2.56	2.87

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-080 (CV040)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3] 2010	Dates														
	2005	2006	2015	2016		13-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	13-Jun-06	02-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	11-Aug-15	11-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-15
Tellurium				0.00020													<0.00020	<0.00020	<0.00020	<0.00020
Thallium	0.0002	-	0.00030	0.000010	0.0008	<0.0002	<0.0002	<0.0002	-	-	-	-	<0.00030	<0.00030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium				0.0001													<0.00010	<0.00010	<0.00010	<0.00010
Tin	0.001	0.01	-	0.00010	-	<0.001	0.001	<0.001	<0.01	<0.01	<0.01	<0.01	-	-			<0.00010	<0.00010	<0.00010	<0.00010
Titanium	0.003	-	-	0.00030	-	<0.003	<0.003	<0.003	-	-	-	-	-	-			0.00455	0.00162	0.00166	0.00112
Tungsten				0.00010													<0.00010	<0.00010	<0.00010	<0.00010
Uranium			0.0010	0.000010									0.0011	0.0010	0.0033	0.0029	0.00051	0.00053	0.00361	0.00367
Vanadium	0.0009	0.001	-	0.00050	-	<0.0009	<0.0009	<0.0009	<0.001	<0.001	0.001	<0.001	-	-			<0.00050	<0.00050	<0.00050	<0.00050
Zinc	0.001	0.01	0.0030	0.0030	0.03	<0.001	0.0010	<0.001	<0.01	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	0.0043	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium				0.00030													<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals and Non-Metals																				
Aluminum	0.004	0.005	0.005			<0.004	<0.004	<0.004	<0.005	<0.005	<0.005	<0.005	0.0056	<0.0050	<0.0050	0.0101	-	-	-	-
Antimony	0.0004	-	0.0001			<0.0004	<0.0004	<0.0004	-	-	-	-	-	-			-	-	-	-
Arsenic	0.005	0.001				<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.00010	<0.00010	0.00010	<0.00010	-	-	-	-
Barium	0.001	0.01				<0.001	0.005	0.007	<0.01	<0.01	<0.01	<0.01	-	-			-	-	-	-
Beryllium	0.005	-				<0.005	<0.005	<0.005	-	-	-	-	-	-			-	-	-	-
Bismuth	0.0003	-				<0.0003	<0.0003	<0.0003	-	-	-	-	-	-			-	-	-	-
Boron	0.05	0.01				<0.05	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	-	-			-	-	-	-
Cadmium	0.0001	0.0001	0.000010			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Calcium	0.05	1	0.05			6.06	35.0	40.5	11	11	38	39	22.5	22.3	37.9	39.6	-	-	-	-
Chromium	0.001	0.001				<0.001	0.002	0.002	<0.001	<0.001	<0.001	<0.001	-	-			-	-	-	-
Cobalt	0.0003	0.0002				<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	<0.0002	-	-			-	-	-	-
Copper	0.0008	0.001	0.00020			<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	<0.001	0.00057	0.00054	0.00076	0.00077	-	-	-	-
Iron	0.02	0.03	0.010			<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	<0.03	<0.010	<0.010	<0.010	0.014	-	-	-	-
Lead	0.0002	0.001	0.000050			<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-
Magnesium	0.005	1	0.05			2.50	13.3	16.0	5	5	14	15	9.49	9.32	17.80	17.00	-	-	-	-
Manganese	0.0007	0.01	0.00050			0.0022	<0.0007	<0.0007	<0.01	<0.01	<0.01	<0.01	<0.00050	<0.00050	<0.00050	0.00	-	-	-	-
Mercury													<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Molybdenum	0.0003	0.005	0.000010			<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.005	0.00007	0.000073	0.000176	0.000174	-	-	-	-
Nickel	0.001	0.005	0.0001			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-
Potassium	0.02	0.01	0.00050			0.39	0.72	0.76	0.61	0.60	0.73	0.80	0.644	0.607	1.240	1.240	-	-	-	-
Selenium	0.005	0.001	0.050			<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-
Silver	0.0001	0.0001	0.00005			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-			-	-	-	-
Sodium	0.05	0.05	0.50			0.29	1.25	1.96	0.42	0.46	1.38	3.12	2.54	2.41	7.10	6.67	-	-	-	-
Strontium	0.001	0.001				0.0027	0.0192	0.0224	0.005	0.005	0.023	0.026	-	-			-	-	-	-
Thallium	0.0002	-	0.000010			<0.0002	<0.0002	<0.0002	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-
Tin	0.001	0.01				<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	-	-			-	-	-	-
Titanium	0.003	-				<0.003	<0.003	<0.003	-	-	-	-	-	-			-	-	-	-
Uranium			0.00001										0.00101	0.00096	0.00300	0.00288	-	-	-	-
Vanadium	0.0009	0.001				<0.0009	0.0047	0.0045	<0.001	<0.001	<0.001	<0.001	-	-			-	-	-	-
Zinc	0.001	0.01	0.0010			0.001	0.002	0.002	<0.01	<0.01	<0.01	<0.01	0.0025	0.0037	<0.0010	0.0029	-	-	-	-

Notes:

Yellow highlight denotes exceedance to CCME guidelines or Baffinland's 2AM-MRY-1325 Water Licence

2005 and 2006 dissolved oxygen values in mg/L; 2015 and 2016 dissolved oxygen values in % saturation

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-100 (CV217)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3] 2010	Dates											
	2005	2006	2015	2016		07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	29-Jul-06	10-Sep-06	12-Aug-15	12-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16
In Situ Parameters												US	DS	US	DS	DS	US
Temperature (^oC)	-	-	-		-	0.74	9.35	6.59	1.56	7.36	3.02	9.6	9.4	5.6	6.4	8.7	10.7
Specific Conductance (mS/cm)	-	-	-		-	0.019	0.081	0.088	0.031	0.083	0.091	0.100	0.101	0.640	0.800	0.102	0.095
Dissolved Oxygen	-	-	-		5.5-9.5	12.14	11.62	12.82	12.71	13.40	-	102.30	102.8	107.4	109.5	94.1	100.0
pH	-	-	-		6.5 - 9.0	7.20	7.60	7.02	7.38	7.59	7.92	8.08	8.07	7.74	8.36	8.19	8.11
Wetted Width (m)	-	-	-		-	-	-	-	-	54	59	-	-	-	-		
Average Depth (m)	-	-	-		-	-	-	-	-	5	2.5	-	-	-	-		
Flow Rate (m^3/s)	-	-	-		-	-	-	-	-	-	-	-	-	-	-		
Physical Parameters																	
pH	-	-	0.01	0.01	6.5 - 9.0	-	-	-	6.97	7.03	6.97	7.79	7.84	7.42	7.41	8.08	7.96
Conductivity (uS/cm)	1	5	-	-	-	27	90	93	38	86	97	-	-	-	-	-	-
Turbidity (NTU)	0.1	0.1	0.1	0.10	-	0.50	0.99	0.55	0.7	1.1	1.4	1.0	1.1	1.10	1.13	2.02	0.99
Hardness (mg/L $CaCO_3$)	0.5	1	10	10	-	8.57	42.0	46.3	16	41	43	37	37	27	29	42	38
TSS				2								32	<2	<2.0	<2.0	<2.0	<2.0
TDS	30	5	20	-	-	31	<30	<30	25	56	63	47 *	48 *	40	25	52	38
Dissolved Anions																	
Alkalinity (mg/L CaCO3)	2	5	10	10	-	8	43	45	16	44	47	37	36	30	31	41	35
Br^-	0.3	0.05	-	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-
Cl^-	0.2	1	0.5	0.50	-	0.8	1.0	1.2	<1	1	2	4.87	5.31	2.44	2.49	3.87	3.79
Fluoride														<0.020	<0.020	<0.020	<0.020
SO_4^-	0.5	1	0.3	0.30	-	0.7	0.6	0.7	2	2	3	1.29	1.35	0.70	0.72	1.15	0.97
Nutrients																	
NH_3+NH_4 (mg/L N)	0.1	0.02	0.15	0.15	0.021 - 231(4)	0.5	<0.10	0.4	0.04	0.05	0.04	<0.15	0.19	<0.15	<0.15	<0.15	<0.15
NO_2^- (mg/L N)	0.06	0.005			0.06	<0.06	<0.06	<0.06	<0.005	0.018	0.008	-	-				
NO_3^- (mg/L N)	0.05	0.10	0.020	0.020	2.9	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.020	<0.020	<0.020	<0.020	0.03	<0.020
NO_2+NO_3 (mg/L N)	0.06	0.10			-	<0.06	<0.06	<0.06	<0.10	<0.10	<0.10	-	-				
Ammonia total as N				0.020										<0.020	0.05	<0.020	<0.020
Total Phosphorus	0.02	0.01	0.003	0.0030	-	<0.02	<0.02	<0.10	<0.01	<0.01	0.02	0.0077	0.0058	0.0068	<0.0030	0.0071	0.0095
Dissolved Phosphorus	0.02	-		-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-
Organic Compounds																	
Phenols	0.001	0.001			0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-
DOC	-	-	0.5	0.5		-	-	-	-	-	-	2.6	2.2	1.8	1.9	2.3	1.9
TOC	-	-	0.5	0.5		-	-	-	-	-	-	2.7	2.6	1.9	1.8	2.3	2.0
TKN	-	-	0.10	0.10		-	-	-	-	-	-	<0.15	0.19	<0.15	<0.15	<0.15	<0.15
Chlorophyll-a	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																	
Aluminum	0.004	0.005	0.010	0.010	0.005 - 0.100(5)	0.025	0.039	0.020	0.023	0.043	0.066	0.094	<0.010	0.042	0.150	0.052	0.037
Antimony	0.0004	-	-	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	0.005	0.0010	0.0010	0.00010	0.0050	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	0.001	0.010	-	0.00020	-	0.002	0.004	0.005	<0.01	<0.01	<0.01	-	-	0.00368	0.00433	0.00576	0.00502
Beryllium	0.005	-	-	0.00010	-	<0.005	<0.005	<0.005	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	0.0003	-	-	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.05	0.010	-	0.010	-	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.010	<0.010	<0.010	<0.010
Cadmium	0.0001	0.0001	-	0.000010	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium	0.05	1	0.5	0.5	-	1.51	8.62	9.34	3	8	9	7.83	8.02	5.19	5.58	8.32	7.66
Cesium				0.000010										<0.000010	0.000016	<0.000010	<0.000010
Chromium	0.001	0.001	-	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	0.0003	0.0002	-	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Copper	0.0008	0.001	0.0010	0.0010	0.002 - 0.004(6)	0.0009	0.0010	0.0008	<0.001	<0.001	0.001	<0.0010	<0.0010	<0.0010	0.0011	0.0010	<0.0010
Iron	0.02	0.03	0.050	0.050	0.3	0.05	0.03	0.02	0.07	0.04	0.04	0.121	<0.050	0.052	0.186	0.058	<0.050
Lead	0.0002	0.001	0.00010	0.00010	0.001 - 0.007(7)	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Lithium				0.0010										<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	0.005	1	0.001	0.05	-	1.16	4.97	5.59	2	5	5	5.01	4.93	3.30	3.59	5.04	4.71
Manganese	0.0007	0.01	0.00001	0.00050	-	0.0183	0.0012	0.0009	<0.01	<0.01	<0.01	0.00339	0.00101	0.00201	0.00408	0.00217	0.00159
Mercury	0.0001	0.0001	0.0005	0.000010	0.000026	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	0.0003	0.005	0.001	0.000050	0.073	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.00050	<0.00050	0.000065	0.000069	0.000099	0.000075
Nickel	0.001	0.005	1	0.00050	0.025 - 0.150(8)	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.0010	<0.0010	0.00077	0.00054	<0.00050	<0.00050

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-100 (CV217)

Parameters	Method Detection Limit[1]		LOR		CCME Guideline Limits[3 2010]	Dates											
	2005	2006	2015	2016		07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	29-Jul-06	10-Sep-06	12-Aug-15	12-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16
Phosphorus				0.050										<0.050	<0.050	<0.050	<0.050
Potassium	0.02	0.01	0.0004	0.05	-	0.81	0.58	0.60	0.49	0.58	0.57	0.64	0.62	0.516	0.580	0.717	0.645
Rubidium				0.00020										0.00073	0.00109	0.00138	0.00110
Selenium	0.005	0.001	-	0.000050	0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon				0.050										0.390	0.603	0.636	0.525
Silver	0.0001	0.0001	0.5	0.000050	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	0.05	0.05	-	0.50	-	0.34	0.68	0.70	0.31	0.72	0.93	2.93	3.05	1.40	1.49	2.25	2.39
Strontium	0.001	0.001	0.0003	0.0010	-	0.0012	0.0049	0.0054	0.002	0.006	0.007	-	-	0.0046	0.0048	0.0079	0.0074
Sulfur				0.50										<0.50	<0.50	<0.50	0.53
Tellurium				0.00020										<0.00020	<0.00020	<0.00020	<0.00020
Thallium	0.0002	-	-	0.000010	0.0008	<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium				0.0001										<0.00010	0.00012	<0.00010	<0.00010
Tin	0.001	0.01	-	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	0.003	-	-	0.00030	-	<0.003	<0.003	<0.003	-	-	-	-	-	<0.0020 *	0.00821	0.00203	0.00165
Tungsten				0.00010										<0.00010	<0.00010	<0.00010	<0.00010
Uranium			0.0010	0.000010								0.000333	0.000323	0.000210	0.000238	0.000368	0.000319
Vanadium	0.0009	0.001	-	0.00050	-	<0.0009	<0.0009	<0.0009	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	0.001	0.01	0.0030	0.0030	0.03	0.0020	0.0020	<0.001	<0.01	<0.01	<0.01	<0.0030	0.0038	<0.0030	<0.0030	0.0053	<0.0030
Zirconium				0.00030										<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals and Non-Metals																	
Aluminum	0.004	0.005	0.0050			0.013	0.006	0.004	0.009	<0.005	0.007	<0.0050	0.0272	-	-	-	-
Antimony	0.0004	-	-			<0.0004	<0.0004	<0.0004	-	-	-	-	-	-	-	-	-
Arsenic	0.005	0.001	0.0001			<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	-	-	-	-
Barium	0.001	0.01	-			0.002	0.004	0.005	<0.01	<0.01	<0.01	-	-	-	-	-	-
Beryllium	0.005	-	-			<0.005	<0.005	<0.005	-	-	-	-	-	-	-	-	-
Bismuth	0.0003	-	-			<0.0003	<0.0003	<0.0003	-	-	-	-	-	-	-	-	-
Boron	0.05	0.01	-			<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-
Cadmium	0.0001	0.0001	0.00001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	-	-	-	-
Calcium	0.05	1	0.05			1.60	9.05	8.60	3	8	9	7.52	7.53	-	-	-	-
Chromium	0.001	0.001	-			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-
Cobalt	0.0003	0.0002	-			<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-
Copper	0.0008	0.001	0.00020			<0.0008	0.0009	0.0010	<0.001	<0.001	<0.001	0.00065	0.00074	-	-	-	-
Iron	0.02	0.03	0.010			0.04	<0.02	<0.02	0.06	<0.03	<0.03	<0.010	0.032	-	-	-	-
Lead	0.0002	0.001	0.00005			<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-
Magnesium	0.005	1	0.0005			1.24	5.23	5.12	2	5	5	4.42	4.47	-	-	-	-
Manganese	0.0007	0.01	-			0.0175	<0.0007	<0.0007	<0.01	<0.01	<0.01	0.00068	0.00181	-	-	-	-
Mercury			0.000010									<0.000010	<0.000010	-	-	-	-
Molybdenum	0.0003	0.005	0.000050			<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	0.000074	0.000080	-	-	-	-
Nickel	0.001	0.005	0.00050			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.00050	<0.00050	-	-	-	-
Potassium	0.02	0.01	0.050			0.85	0.61	0.58	0.48	0.54	0.57	0.602	0.626	-	-	-	-
Selenium	0.005	0.001	0.000050			<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-
Silver	0.0001	0.0001	-			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-
Sodium	0.05	0.05	-			0.37	0.72	0.68	0.31	0.72	1.02	2.68	2.83	-	-	-	-
Strontium	0.001	0.001				0.0013	0.0052	0.0049	0.002	0.006	0.007	-	-	-	-	-	-
Thallium	0.0002	-	0.00010			<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	-	-	-	-
Tin	0.001	0.01	-			<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	-	-
Titanium	0.003	-	-			<0.003	<0.003	<0.003	-	-	-	-	-	-	-	-	-
Uranium			0.000010									0.000296	0.000308	-	-	-	-
Vanadium	0.0009	0.001	-			<0.0009	0.0015	<0.0009	<0.001	<0.001	<0.001	-	-	-	-	-	-
Zinc	0.001	0.01	0.001			0.002	0.002	0.001	<0.01	<0.01	<0.01	<0.0010	0.0026	-	-	-	-

Notes:

Yellow highlight denotes exceedance to CCME guidelines or Baffinland's 2AM-MRY-1325 Water Licence

2005 and 2006 dissolved oxygen values in mg/L; 2015 and 2016 dissolved oxygen values in % saturation

Baffinland

Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-110 (BG24)

Site ID	Method Detection Limit[1]		LOR		CCME Guideline Limits[3] 2010	Dates											
	2005	2006	2015	2016		07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	29-Jul-06	10-Sep-06	12-Aug-15	12-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16
In Situ Parameters												US	DS	DS	US	DS	US
Temperature (°C)	-	-	-		-	3.76	9.54	7.00	1.99	7.11	4.35	6.8	6.9	5.1	5.0	4.5	5.1
Specific Conductance (mS/cm)	-	-	-		-	0.019	0.079	0.082	0.075	0.076	0.095	0.050	0.050	0.112	0.114	0.371	0.367
Dissolved Oxygen	-	-	-		5.5-9.5	10.40	10.91	11.71	12.8	13.55	-	104.30	103.00	104.9	105.80	99.30	103.20
pH	-	-	-		6.5 - 9.0	8.07	7.58	7.02	7.55	7.51	7.88	8.58	8.51	7.75	7.84	7.91	7.97
Wetted Width (m)	-	-	-		-	-	-	-	6	17	5	1.5	1.5	4.8	4.8		
Average Depth (m)	-	-	-		-	-	-	-	0.4	0.9	0.3	0.25	0.25	0.2	0.2		
Flow Rate (m^3/s)	-	-	-		-	-	-	-	1.1	3.64	0.39	-	-	-	-		
Physical Parameters																	
pH	-	-	0.01	0.01	6.5 - 9.0	-	-	-	7.40	6.95	6.95	8.34	8.29	7.84	7.91	8.15	8.30
Conductivity (uS/cm)	1	5	-	-	-	26	88	82	84	78	119			-	-	-	-
Turbidity (NTU)	0.1	0.1	0.10	0.10	-	0.42	3.64	1.93	0.5	2.3	4.9	0.16	0.27	0.41	0.39	0.34	0.22
Hardness (mg/L $CaCO_3$)	0.5	1	10	10	-	7.14	43.6	43.4	47	41	52	133	136	52	52	168	169
TSS			2.0									<2	<2	<2.0	<2.0	<2.0	<2.0
TDS	30	5	-	20	-	<30	51	<30	55	51	77	146 *	139 *	45	45	183	183
Dissolved Anions																	
Alkalinity (mg/L CaCO3)	2	5	10	10	-	5	43	41	41	40	53	135	141	51	53	152	149
Br^-	0.3	0.05	-	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-
Cl^-	0.2	1	0.50	0.50	-	1.3	0.6	0.7	1	<1	4	5.2	5.3	0.8	0.8	16.5	18.0
Fluoride														0.024	0.029	0.052	0.059
SO_4^-	0.5	1	0.30	0.30	-	1.2	<0.5	0.5	2	2	4	5.5	5.4	0.8	0.6	12.2	13.7
Nutrients																	
NH_3+NH_4 (mg/L N)	0.1	0.02	0.15	0.15	0.021 - 231(4)	0.7	0.4	0.6	<0.02	<0.02	<0.02	0.24	0.29	<0.15	<0.15	<0.15	<0.15
NO_2^- (mg/L N)	0.06	0.005			0.06	<0.06	<0.06	<0.06	<0.005	0.017	0.009						
NO_3^- (mg/L N)	0.05	0.1	0.02	0.02	2.9	0.12	<0.05	<0.05	<0.10	<0.10	<0.10	0.03	0.03	<0.020	<0.020	0.07	0.08
NO_2+NO_3 (mg/L N)	0.06	0.1			-	0.12	<0.06	<0.06	<0.10	<0.10	<0.10						
Ammonia, total as N			0.02											0.07	0.07	<0.020	<0.020
Total Phosphorus	0.02	0.01	0.003	0.003	-	0.02	<0.02	<0.10	<0.01	<0.01	0.01	<0.0030	<0.0030	<0.0030	0.0052	0.0041	0.0037
Dissolved Phosphorus	0.02	-	-		-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-
Organic Compounds																	
Phenols	0.001	0.001		0.00	0.004	0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-
DOC	-	-	0.5	0.50		-	-	-	-	-	-	2.3	2.3	<1.0	<1.0	2.0	2.0
TOC	-	-	0.5	0.50		-	-	-	-	-	-	2.3	2.4	<1.0	<1.0	2.2	2.1
TKN	-	-	0.1	0.10		-	-	-	-	-	-	0.24	0.29	<0.15	<0.15	<0.15	<0.15
Chlorophyll-a	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																	
Aluminum	0.004	0.005	0.010	0.010	0.005 - 0.100(5)	0.017	0.075	0.073	0.010	0.072	0.153	<0.010	0.018	0.022	0.015	0.011	<0.010
Antimony	0.0004	-	-	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	0.005	0.001	0.0010	0.00010	0.0050	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	0.00010
Barium	0.001	0.01	-	0.00020	-	<0.001	0.004	0.004	<0.01	<0.01	<0.01	-	-	0.00197	0.00176	0.00778	0.00702
Beryllium	0.005	-	-	0.00010	-	<0.005	<0.005	<0.005	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	0.0003	-	-	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050
Boron	0.05	0.01	-	0.010	-	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.010	<0.010	0.01	0.01
Cadmium	0.0001	0.0001	-	0.000010	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium	0.05	1	0.5	0.5	-	1.43	9.01	8.72	8	8	12	29.9	32.2	10.9	10.8	35.3	35.8
Cesium				0.000010										<0.000010	<0.000010	<0.000010	<0.000010
Chromium	0.001	0.001	-	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	0.002	<0.00050	<0.00050	<0.00050
Cobalt	0.0003	0.0002	-	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Copper	0.0008	0.001	0.0010	0.0010	0.002 - 0.004(6)	<0.0008	0.0009	<0.0008	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Iron	0.02	0.03	0.050	0.050	0.3	<0.02	0.05	0.06	0.03	0.05	0.08	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Lead	0.0002	0.001	0.00010	0.00010	0.001 - 0.007(7)	<0.0002	0.0004	<0.0002	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Lithium				0.0010										<0.0010	0.001	0.004	0.004
Magnesium	0.005	1	0.001	0.05	-	0.868	5.12	5.24	5	5	7	16.4	17.4	5.9	6.0	19.3	19.3
Manganese	0.0007	0.01	0.00001	0.00050	-	0.0097	0.0024	0.0014	<0.01	<0.01	<0.01	0.00054	0.00335	0.00126	<0.00050	0.00526	0.00080
Mercury	0.0001	0.0001	0.0005	0.000010	0.000026	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum	0.0003	0.005	0.001	0.000050	0.073	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.000050	<0.000050	0.000109	0.000112
Nickel	0.001	0.005	1	0.00050	0.025 - 0.150(8)	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050

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Table 3.2 Water Quality Monitoring of Baseline Fisheries Culverts

SURFACE WATER QUALITY SUMMARY FOR SAMPLE SITE N1-110 (BG24)

Site ID	Method Detection Limit[1]		LOR		CCME Guideline Limits[3] 2010	Dates											
	2005	2006	2015	2016		07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	29-Jul-06	10-Sep-06	12-Aug-15	12-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16
Phosphorus				0.050										<0.050	<0.050	<0.050	<0.050
Potassium	0.02	0.01	0.0004	0.05	-	0.77	0.48	0.51	0.50	0.51	0.50	0.57	0.65	0.30	0.27	0.82	0.73
Rubidium				0.00020										0.00033	0.00024	0.00094	0.00046
Selenium	0.005	0.001	-	0.000050	0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon				0.050										0.393	0.381	0.743	0.730
Silver	0.0001	0.0001	0.5	0.000050	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	0.05	0.05	-	0.50	-	0.43	0.51	0.48	0.57	0.48	1.61	5.22	5.33	0.77	0.75	8.94	9.62
Strontium	0.001	0.001	0.0003	0.0010	-	0.0011	0.0049	0.0048	0.005	0.005	0.008	-	-	0.0056	0.0056	0.0250	0.0262
Sulphur				0.50										<0.50	<0.50	4.800	5.240
Tellurium				0.00020										<0.00020	<0.00020	<0.00020	<0.00020
Thallium	0.0002	-	-	0.000010	0.0008	<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium				0.0001										<0.00010	<0.00010	<0.00010	<0.00010
Tin	0.001	0.01	-	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	0.003	-	-	0.00030	-	<0.003	<0.003	<0.003	-	-	-	-	-	0.00087	0.00052	0.00055	<0.00030
Tungsten				0.00010										<0.00010	<0.00010	<0.00010	<0.00010
Uranium	-	-	0.0010	0.000010		-	-	-	-	-	-	0.000941	0.000943	0.000116	0.000109	0.001200	0.001310
Vanadium	0.0009	0.001	-	0.00050	-	<0.0009	<0.0009	<0.0009	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	0.001	0.01	0.0030	0.0030	0.03	0.0040	0.0010	0.0020	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium				0.00030										<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals and Non-Metals																	
Aluminum	0.004	0.005	0.0050			0.010	0.009	0.007	<0.005	<0.005	<0.005	<0.0050	<0.0050	-	-	-	-
Antimony	0.0004	-	-			<0.0004	<0.0004	<0.0004	-	-	-	-	-	-	-	-	-
Arsenic	0.005	0.001	0.0001			<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	-	-	-	-
Barium	0.001	0.01	-			<0.001	0.003	0.004	<0.01	<0.01	<0.01	-	-	-	-	-	-
Beryllium	0.005	-	-			<0.005	<0.005	<0.005	-	-	-	-	-	-	-	-	-
Bismuth	0.0003	-	-			<0.0003	<0.0003	<0.0003	-	-	-	-	-	-	-	-	-
Boron	0.05	0.01	-			<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-
Cadmium	0.0001	0.0001	0.00001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	-	-	-	-
Calcium	0.05	1	0.05			1.54	9.19	8.14	9	8	11	28.0	28.9	-	-	-	-
Chromium	0.001	0.001	-			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-
Cobalt	0.0003	0.0002	-			<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-
Copper	0.0008	0.001	0.00020			<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	0.00066	0.00063	-	-	-	-
Iron	0.02	0.03	0.010			<0.02	0.02	<0.02	<0.03	<0.03	<0.03	<0.010	<0.010	-	-	-	-
Lead	0.0002	0.001	0.00005			<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-
Magnesium	0.005	1	0.0005			0.933	5.30	4.87	6	5	6	15.4	15.6	-	-	-	-
Manganese	0.0007	0.01	-			0.0092	0.0007	<0.0007	<0.01	<0.01	<0.01	<0.00050	0.00275	-	-	-	-
Mercury	-	-	0.000010			-	-	-	-	-	-	<0.000010	<0.000010	-	-	-	-
Molybdenum	0.0003	0.005	0.000050			<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	0.00009	0.00010	-	-	-	-
Nickel	0.001	0.005	0.00050			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.00050	<0.00050	-	-	-	-
Potassium	0.02	0.01	0.050			0.83	0.51	0.49	0.52	0.50	0.50	0.58	0.64	-	-	-	-
Selenium	0.005	0.001	0.000050			<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-
Silver	0.0001	0.0001	-			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-
Sodium	0.05	0.05	-			0.47	0.53	0.47	0.58	0.50	1.64	5.04	4.95	-	-	-	-
Strontium	0.001	0.001				0.0011	0.0045	0.0044	0.005	0.005	0.008	-	-	-	-	-	-
Thallium	0.0002	-	0.00010			<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	-	-	-	-
Tin	0.001	0.01	-			<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	-	-
Titanium	0.003	-	-			<0.003	<0.003	<0.003	-	-	-	-	-	-	-	-	-
Uranium	0.00001	-	0.000010			-	-	-	-	-	-	0.000883	0.000880	-	-	-	-
Vanadium	0.0009	0.001	-			<0.0009	0.0013	<0.0009	<0.001	<0.001	<0.001	-	-	-	-	-	-
Zinc	0.001	0.01	0.001			0.003	0.003	0.002	<0.01	<0.01	<0.01	<0.0010	0.0019	-	-	-	-

Notes:

Yellow highlight denotes exceedance to CCME guidelines or Baffinland's 2AM-MRY-1325 Water Licence

2005 and 2006 dissolved oxygen values in mg/L; 2015 and 2016 dissolved oxygen values in % saturation

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Table 3.3. Summary of fish habitat status at existing fish-bearing streams along the Tote Road in 2016.

Water Crossing No.	Fish Habitat Quality Rating [1]	New or Replaced Culverts [2]	Fish Observed during 2016 Survey	Potential Fish Passage/Habitat Issues	Detailed Observations	Recommendations and Follow-Up / Corrective Actions
CV176	MAR	Y	N	N	Water levels during survey were very low, providing no habitat near the crossing.	Note that there is no natural fish habitat upstream of these crossings, regardless of water level, so passage is unnecessary, but must make sure there are no downstream effects. To be monitored in 2017.
CV169	MAR	Y	N	N	Water levels during survey were very low, providing no habitat near the crossing.	None
CV167	MAR	N	N	N	Water levels during survey were very low, providing no habitat near the crossing.	Remove culvert on old road or ensure steaming for passage. To be completed during 2017.
CV129	IMP	Y	Y	Y	Fish observed upstream and downstream. Culvert badly damaged with pieces in the water upstream. Road dust coating much of the substrate in the vicinity of the crossing as with all crossings.	Clean up culvert debris and monitor passage in case damaged culvert becomes a larger issue. These recommendations implemented later in July and August 2016.
CV128	IMP	Bridge Only	Y	N	Fish observed upstream and downstream. No issues with passage or habitat, though old sea containers still need to be removed.	Remove old sea containers. Scheduled to be removed by end of March 2017.
CV114	MAR	N	Y	Y	Culverts damaged with debris instream; may eventually affect passage Left culvert (looking US) has become slightly perched; right culvert OK.	Remove culvert debris and closely monitor passage in both culverts. Debris was removed during July and August 2016. Culvert to be targeted as part of the 2017 TREEP.
CV112	IMP	N	Y	Y	Fish observed upstream and downstream. Right-hand culvert (looking US) has been obliterated and may currently be obstructing some movement.	This culvert will need to be repaired or replaced if it is to continue allowing unobstructed passage. This culvert is to be targeted as part of the 2017 TREEP.

Table 3.3. Summary of fish habitat status at existing fish-bearing streams along the Tote Road in 2016.

Water Crossing No.	Fish Habitat Quality Rating [1]	New or Replaced Culverts [2]	Fish Observed during 2016 Survey	Potential Fish Passage/Habitat Issues	Detailed Observations	Recommendations and Follow-Up / Corrective Actions
CV111	IMP	N	Y	N	Fish observed upstream and downstream. No passage issues.	None
CV106	MAR	N	Y	Y	Fish observed downstream. Culvert has become perched and may be affecting fish passage.	The perch is likely to worsen; will need to reinstall or build up downstream habitat. This culvert is to be targed as part of the 2017 TREEP.
CV104	MAR	Y	Y	Y	Fish observed upstream and downstream. Though fish passage was observed, the upstream end of the culvert is damaged and a little steep, which may limit passage success.	Repair culvert to prevent culvert becoming problem for fish passage. This culvert was replaced during the Fall 2016.
CV102	IMP	N	N	N	Current water levels too low for fish. No stranding issues this year.	None
CV099	IMP	Y	Y	Y	Fish observed upstream and downstream. Right culvert is starting to become perched.	Closely monitor culvert for any worsening of the perch. May need to properly reinstall or mitigate with a fish ladder if perch increases. This culvert is to be targeted as part of the 2017 TREEP.
CV087	MAR	N	N	N	Stream dry or nearly dry at time of visit. No fish observed. Culverts should not affect passage during high water periods, when fish have access to the crossing.	None
CV080	IMP	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None
CV079	IMP	N	Y	N	Fish observed upstream and downstream. No issues with stranding.	None
CV078	IMP	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None

Table 3.3. Summary of fish habitat status at existing fish-bearing streams along the Tote Road in 2016.

Water Crossing No.	Fish Habitat Quality Rating [1]	New or Replaced Culverts [2]	Fish Observed during 2016 Survey	Potential Fish Passage/Habitat Issues	Detailed Observations	Recommendations and Follow-Up / Corrective Actions
CV076	MAR	N	Y	N	Fish observed upstream and downstream. No issues with passage.	None
CV072	IMP	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None
CV071	MAR	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None
CV060	IMP	N	Y	N	Fish observed upstream and downstream. Culvert a little perched.	None
CV059	MAR	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None
CV058	MAR	N	Y	Y	Fish observed upstream and downstream. Culverts are getting crushed, which could affect future passage.	Repair or replace culverts. This culvert to be targeted as part of the 2017 TREEP.
CV057	MAR	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None
BG50	IMP	Y	Y	Y	Fish observed upstream and downstream. Culverts in right-hand channel are completely impassable due to very high perch. Old sea container crossing is becoming increasingly perched, limiting passage to larger juveniles in the left-hand channel.	Old sea containers were removed in late November 2016. Habitat improvement will be confirmed in 2017. Culverts in the right-hand channel will need to be re-installed and properly embedded. This culvert is being targeted as part of the 2017 TREEP.
CV049	IMP	N	Y	Y	Fish observed upstream and downstream. No issues with passage or habitat.	None

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Table 3.3. Summary of fish habitat status at existing fish-bearing streams along the Tote Road in 2016.

Water Crossing No.	Fish Habitat Quality Rating [1]	New or Replaced Culverts [2]	Fish Observed during 2016 Survey	Potential Fish Passage/Habitat Issues	Detailed Observations	Recommendations and Follow-Up / Corrective Actions
CV030	MAR	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None
BG32	IMP	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None
CV217	IMP	Y	Y	N	Fish observed upstream and downstream. No issues with passage or habitat, though old sea containers should be removed at the earliest convenience.	Remove old sea containers
CV216	MAR	N	Y	Y	Fish observed downstream only. Culvert becoming perched and YOY that use this stream will not have access US habitat if they don't already.	May need to properly reinstall or mitigate with a fish ladder if perch increases. This crossing is being targeted as part of the 2017 TREEP.
BG30	IMP	N	Y	N	Fish observed upstream and downstream. Passage is confirmed, but the fish ladder will need to be monitored annually for any changes.	Fish ladder functioning, but will need regular monitoring and possible modifications if culvert perches more.
BG29	IMP	N	Y	Y	Fish observed upstream and downstream. No issues with passage, but a large mound of apparent road sediment is present in the stream	This sediment will likely be washed DS during next high flow event; but it needs to be prevented in the future. The immediate sedimentation issue was addressed during July 2016. The culvert will be targeted for long term mitigation as part of the 2017 TREEP.
BG27	MAR	N	Y	Y	Fish observed downstream only. A rocky barrier was placed downstream of the culvert preventing all fish access.	Remove the rocky barrier. This culvert will be targeted as part of the 2017 TREEP.
BG24	IMP	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None

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Table 3.3. Summary of fish habitat status at existing fish-bearing streams along the Tote Road in 2016.

Water Crossing No.	Fish Habitat Quality Rating [1]	New or Replaced Culverts [2]	Fish Observed during 2016 Survey	Potential Fish Passage/Habitat Issues	Detailed Observations	Recommendations and Follow-Up / Corrective Actions
BG17	IMP	N	Y	Y	Fish observed upstream and downstream. No issues with passage, but a large, unnatural mound of reddish, metallic clay observed US.	May need to remove the foreign clay. The immediate sedimentation issue was addressed during July 2016. The culvert and upstream sources of this material will be targeted for long term mitigation as part of the 2017 TREEP.
BG04	IMP	N	Y	N	Fish observed upstream and downstream. No issues with passage or habitat.	None
CV001	IMP	Y	Y	N	Fish observed downstream only due to very low water levels near the crossing. No issues with passage or habitat at normal water levels.	None
CV223	IMP	N	Y	Y	Fish observed upstream and downstream. No issues with passage, but culverts are getting damaged and some debris is accumulating instream.	Remove debris and repair or replace culverts. The immediate sedimentation issue was addressed during July 2016. This culvert will be targeted as part of the 2017 TREEP.
CV224	IMP	N	Y	Y	Fish observed upstream and downstream. No issues with passage, but road debris (plastic reflective posts) in the water.	Road debris was in the water around the culvert. The immediate debris issue was addressed during July 2016. This culvert will be targeted as part of the 2017 TREEP
CV225	IMP	Y	Y	Y	Fish observed upstream and downstream. New culvert installation is currently okay, but there is potential for perching. Right culvert blocked by sediment or ice at the time of survey.	Culvert blockage may need to be removed. This condition is to be monitored during 2017.
BG01	IMP	N	Y	Y	Fish observed upstream and downstream. Culvert remains perched, making passage during periods of high velocity or low water difficult, particularly for smaller juveniles. Rocky ramp remains intact, but any change will likely prevent all passage.	This crossing needs one or two properly embedded, larger culverts to replace the existing ones. Continue to closely monitor for change. This culvert will be targeted as part of the 2017 TREEP

Table 3.3. Summary of fish habitat status at existing fish-bearing streams along the Tote Road in 2016.

Water Crossing No.	Fish Habitat Quality Rating [1]	New or Replaced Culverts [2]	Fish Observed during 2016 Survey	Potential Fish Passage/Habitat Issues	Detailed Observations	Recommendations and Follow-Up / Corrective Actions
CV186	IMP	N	Y	Y	Fish observed downstream only. Though there are no issues with passage through the culvert, there is a layer of road sediment covering the substrate within at least 50 m of the crossing upstream and downstream - this smothering of the substrate may be affecting fish use of this stream during the late summer feeding period. There has been improvement in this issue since 2015, but more needs to be done.	Diligent dust control in the vicinity of this crossing and higher, rip-rapped road embankments may alleviate much of the deposition. Spring freshet may also transport loose materials downstream into Sheardown Lake. The immediate sedimentation issue was addressed during July and August 2016. This culvert will be targeted as part of the 2017 TREEP
CV187	MAR	N	N	Y	Though there are no issues with passage through the culvert, there are similar road sediment issues as for CV187 In addition, there is a flow meter station immediately upstream of the culvert that is completely blocking any further movements of fish.	Similar recommendations to CV-186; and remove or modify the flow meter station to allow passage. The immediate sedimentation and fish passage issues were addressed during July and August 2016. This culvert will be targeted as part of the 2017 TREEP

1 - Habitat status assessed for current crossings prior to pending upgrades; NFB = not fish-bearing, MARG = marginal, IMP = important
2 - Fish habitat status assessed for new (2015 and 2016) crossings following road upgrades; NC = no change

Table 4.1. Installation summary of HADD and habitat compensation sites along the Tote Road.

Crossing ID	Road Chainage (km + m)	Crossing Size Classification	Authorization (HADD or Compensation)[1]	Initial Work Completion Date[2]	Additional Work Completion Date[3]	Years Monitored	Additional Monitoring Required
CV-183	0+145	Extra-large	Compensation	Oct-08	N/A	2009-2010	None
CV-181	0+583	Medium	Compensation	24-Jul-09	N/A	2008-2010	None
CV-129	15+650	Large	HADD	17-Sep-07	July 2011 Winter 2014/15	2008-2012, 2015, 2016	Culvert damaged in 2016, monitor for continued passage success
CV-128	17+486	Extra-large	HADD	23-Sep-07	Winter 2013/14 March 2017	2009-2010, 2014-2016	Routine Only
CV-114	29+647	Medium	HADD	29-Sep-07	July 2011	2009-2012, 2015, 2016	Culverts damaged in 2016, monitor for continued passage success
CV-111	31+990	Medium	HADD	28-Sep-07	N/A	2009-2010, 2015, 2016	Routine Only
CV-104	33+794	Medium	HADD	01-Oct-07	November 2016	2009-2010, 2015, 2016	Culvert replaced in 2016, monitor passage success of new culverts
CV-099	37+840	Large	HADD	04-Oct-07	Winter 2014/15	2008-2010, 2015, 2016	Routine Only
CV-079	50+600	Large	HADD	08-Jul-08	N/A	2008-2010, 2015, 2016	Routine Only
CV-078	51+171	Large	HADD	09-Jul-08	N/A	2008-2012, 2015, 2016	Routine Only
CV-072	53+878	Large	HADD	05-Mar-08	N/A	2009-2010, 2015, 2016	Routine Only
CV-060	58+856	Medium	HADD	27-Feb-08	N/A	2009-2010, 2015, 2016	Routine Only
BG-50	62+804	Extra-large	HADD	30-Oct-07	Winter 2013/14 Winter 2014/15 November 2016	2008-2010, 2014-2016	Significant monitoring post-removal of old sea containers and reinstallation of currently perched culverts
CV-049	63+302	Large	HADD	10-Mar-08	N/A	2009-2010, 2015, 2016	Routine Only

Table 4.1. Installation summary of HADD and habitat compensation sites along the Tote Road.

Crossing ID	Road Chainage (km + m)	Crossing Size Classification	Authorization (HADD or Compensation)[1]	Initial Work Completion Date[2]	Additional Work Completion Date[3]	Years Monitored	Additional Monitoring Required
BG-32	78+161	Large	HADD	04-Apr-08	August 2012	2009-2010, 2015, 2016	Routine Only
CV-217	79+915	Extra-large	HADD	17-Apr-08	Winter 2013/14 Winter 2014/15 March 2017	2009-2010, 2014-2016	Detailed monitoring following removal of sea containers in Dec 2016
CV-216	80+646	Large	HADD	08-Jun-08	N/A	2009-2010, 2015, 2016	Monitor increased perching
BG-30	84 + 636	Small	Compensation	2012	August 2012	2010-2013, 2015, 2016	Routine monitoring and maintenance of constructed fishway
BG-24	87+710	Medium	HADD	15-May-08	N/A	2008-2010, 2015, 2016	Routine Only
BG-17	90+167	Large	HADD	09-May-08	N/A	2009-2010, 2015, 2016	Routine and possibly remove erosional material in stream bed
BG-16	90+218	Extra-small	Compensation	Oct-08	N/A	2009	Routine Only
BG-04	94+148	Medium	HADD	05-May-08	August 2012	2009-2010, 2015, 2016	Routine Only
CV-001	94+728	Small	Compensation	08-May-08	Winter 2014/15	2009-2010, 2015, 2016	Routine Only
CV-223	97+155	Extra-large	HADD	03-May-08	Winter 2013/14	2008-2010, 2014-2016	Culverts damaged in 2016, monitor for continued passage success
CV-224	97+758	Medium	HADD	04-May-08	N/A	2008-2010, 2015, 2016	Routine Only
CV-225	98+989	Large	HADD	21-Sep-07	August 2010 Winter 2014/15	2008-2011, 2015, 2016	Routine and watch for sediment obstructions in the culverts
BG-01	99+672	Medium	HADD	20-Sep-07	August 2010	2008-2011, 2015, 2016	Monitor closely for increasing obstruction of passage
CV-187	103+078	Small	Compensation	14-Jun-08	N/A	2008-2010, 2015, 2016	Monitor for the effects of road dust on stream habitat

1 - Includes only current HADD and compensation sites and not those eliminated from calculations following 2010 surveys
2 - Includes work outlined during the initial planning and construction phase
3 - Includes repair work, installation of fish access improvement structures, and ERP upgrades

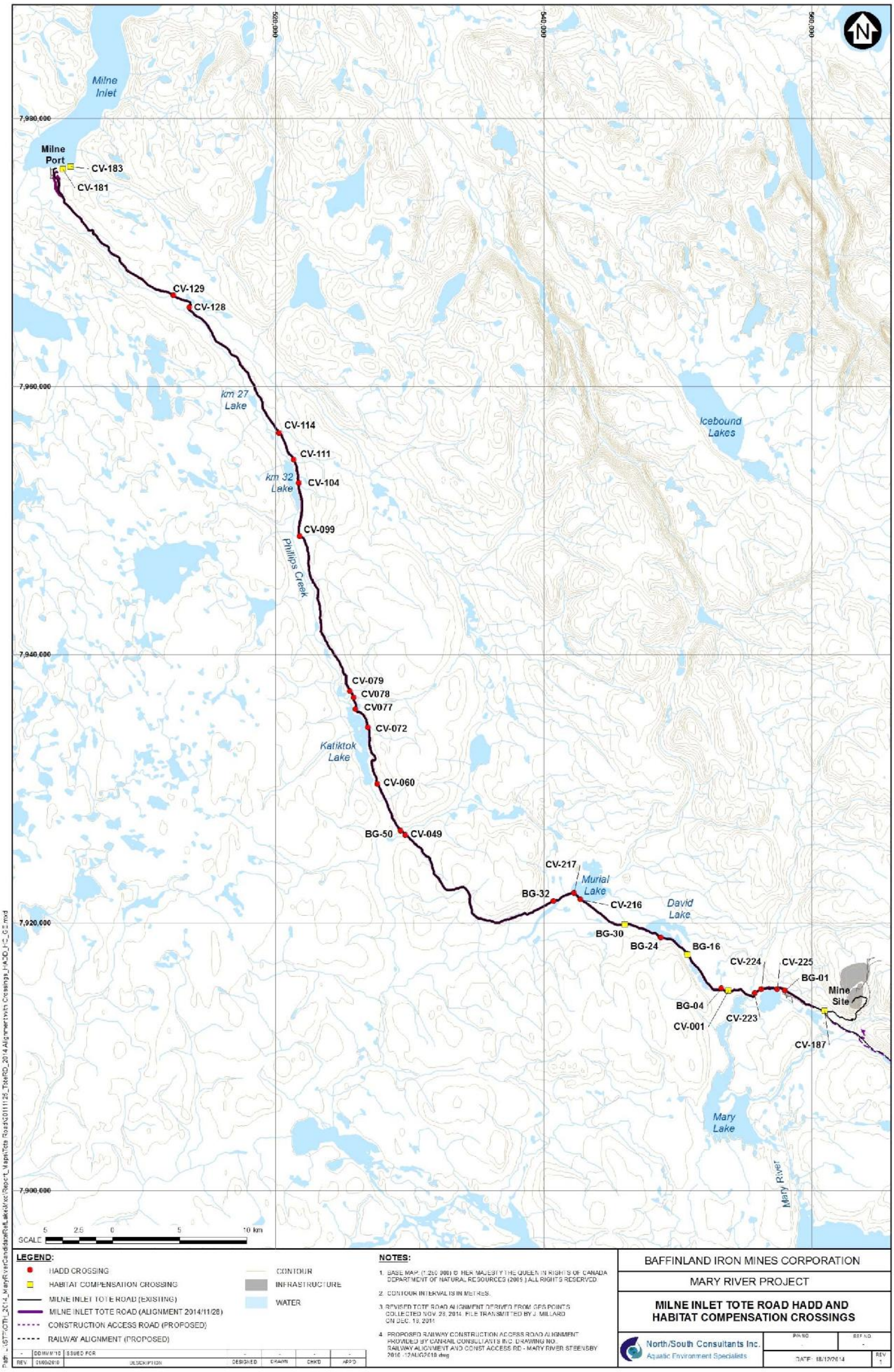

Figure 1.1. Map of the HADD and compensation crossings along the Tote Road.

Baffinland

Appendix A: Applicable DFO Letters of Advice

FINAL REPORT
December 31, 2016

Fisheries and Oceans Canada | Pêches et Océans Canada

301-5204 50th Avenue
Yellowknife, NT
X1A 1E2

our file Votre référence

September 20, 2013

Our file Notre référence
07-HCAA-CA7-00050

Oliver Curran
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Curran:

Subject: Proposal not likely to result in impacts to fish and fish habitat.

Fisheries and Oceans Canada – Fisheries Protection Program (DFO) received your proposal on August 29, 2013. Please refer to the file number and title below:

DFO File No.: **07-HCAA-CA7-00050**
Title: **Mary River Iron Ore Project, Baffin Island (Baffinland), Nunavut**

You may be aware of changes to the *Fisheries Act*, however these have not affected the review of your project at this time. For more information on current changes to the *Fisheries Act* please refer to the DFO website at www.dfo-mpo.gc.ca/media/infocus-alaune/2012/habitat-eng.htm.

Your proposal has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.*

Our review consisted of:

Changes to Culverts along the Tote Road, Submission dated August 29, 2013 from Oliver Curran - Baffinland Iron Mines Corporation

Freshwater Aquatic Baseline Synthesis Report 2005-2011 (January 2012), Baffinland Iron Mines Corporation, Mary River Project, Prepared by North/South Consultants Inc.

*Those sections most relevant to the review of development proposals include 20, 22, 32 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

Canada

We understand that you propose to carry out the following culvert upgrades along the Tote Road:

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of Rip Rap (m2)	Proposed Culvert Upgrate
BG31A	1.2	19.5	24.96	Extend 1m left & 2.5m right
BG30	1	22	17.33	Extend 7m right
BG29	1	31	0	Extend 7.5m left & 8.5m right
BG27B	0.5	31	4.33	Extend 5m left & 8m right
BG27C	0.5	31	0	Extend 5m left & 8m right
BG27A	0.5	31	0	Extend 4.5m left & 8.5m right
BG17A	1.2	36.5	24.96	Extend 8m left & 13.5m right
BG17B	1.2	37.5	24.96	Extend 15.5m left & 7m right
BG04A	1.2	24	0	Extend 5.5m left & 3.5m right
BG04B	1.2	24	0	Extend 5m left & 4m right
CV224A	1	26	0	Extend 6m left & 5m right
CV224B	1	26.5	0	Extend 6.5m left & 5m right
CV225B	1.2	18	0	Replace with new length of 18m
CV225A	1	18.5	17.33	Replace with new length of 18.5m
BG01C	1.2	37	24.96	Extend 11m left & 8m right
BG01A	1.2	36.5	24.96	Extend 11.5m left & 7m right
BG01B	1.2	37	24.96	Extend 12m left & 7m right
BG01D	0.5	10	0	New Culvert
BG01F	0.5	18	0	New Culvert
BG01E	1.0	10	0	New Culvert
BG01G	0.5	23	0	New Culvert
CV186	1	27	0	Extend 6m left
CV187A	0.5	20.5	0	Extend 6m left & 4.5m right
CV187B	0.5	16	0	New Culvert
CV166A	1	23.5	17.33	Extend 8.5m right
CV166B	0.5	22.5	0	Extent 7.5m right
CV115A	0.5	17.5	0	Extend 2.5m left
CV115B	1	17	0	Extend 2m left

Provided that your plans are implemented as described DFO has concluded that your proposal is not likely to result in impacts to fish and fish habitat.

You will not need to obtain a formal approval from DFO in order to proceed with your proposal.

If the plans have changed or if the description of your proposal is incomplete you should contact this office to determine if the advice in this letter still applies.

Please be advised that any unauthorized impacts to fish and fish habitat which result from a failure to implement this proposal as described could lead to corrective action such as enforcement.

If you have any questions please contact the undersigned at (867) 669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca.

Yours sincerely,

Georgina Williston

Georgina Williston
Fisheries Protection Biologist

cc. Stuart Niven- Fisheries and Oceans Canada
Jim Millard- Baffinland Iron Mines Corporation
Bevin LeDrew- Sikumiut Environmental Management Ltd.

Fisheries and Oceans Canada | Pêches et Océans Canada

301-5204 50th Ave
Yellowknife, NT
X1A 1E2

Our file *Notre référence*
NU-07-0050

December 16, 2013

Baffinland Iron Mines Corp.
275 Upper Middle Road East Suite 300
Oakville, ON L6H 0C3

Dear Mr. Curran:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish.

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on August 28, 2013.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act.*

Our review consisted of:

Baffinland Submission: Tote Road Upgrade-Four Seacan Bridge Replacements, Tote Road Upgrade- Fish Bearing Culvert submission, Attachments 1 &2, August 2013.

We understand that you propose to: Upgrade the following crossings along the Tote Road.

The following seacan crossings will be removed and replaced with clear span bridges

- STA 17 (CV 128)
- STA 62 (BG50)
- STA 80 (CV 217)
- STA 97 (CV223)

The following culvert crossings will be upgraded as follows:

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of Rip Rap (m2)	Proposed works to be completed
CV217B	1.2	16	24.96	Extend 1m right
CV217C	1.2	16	24.96	Extend 1m right
CV217A	1.2	16	24.96	Extend 1m right
CV217D	0.15		0	Abandon
CV216B	1.2	17.5	0	Extend 1.5m left & 1m right
CV216C	1.2	16.5	0	Extend 1.5m left
CV216A	1.2	18.5	0	Extend 1.5m left & 2m right
CV216D	0.5	14.5	0	Replace with new length of 14.5m
CV216E	0.5	14	0	Abandon and replace with new length of 14m
CV216F	0.5	12	0	Replace with new length of 12m
CV223B	1.2	28	24.96	Extend 13m left
CV223C	1.2	28	24.96	Extend 13m left
CV223D	1.2	29	24.96	Extend 14m left
CV223A	2	24	69.33	Extend 14m left
CV223E	1.2	19.5	0	Extend 4.5m left
CV223F	1.2	19	0	Extend 4m left
CV115C	0.5	15.5	0	Extend 3.5m right
CV115D	0.5	17	4.33	Extend 8m left
CV114A	1	15.5	17.33	Extend 0.5m right
CV114B	0.5	14	0	Extend 5m left
CV114C	0.5	11	4.33	Replace with new length of 11m
CV114D	0.5	11.5	4.33	Extend 2m left & 0.5m right
CV112A	1.2	17.5	24.96	Extend 2.5m right
CV112B	0.5	24	0	Extend 9m right
CV112C	0.5	21	4.33	Extend 9m left
CV111	1	24	17.33	Extend 4.5m left & 1.5m right
CV106	1	19	17.33	Extend 4m left
CV104A	1.2	19	24.96	Extend 4m left
CV104B	1.2	19	24.96	Extend 4m left
CV102A	1	22.5	17.33	Extend 7.5m left
CV102B	0.5	21.5	0	Extend 6.5m left
CV102C	0.5	21.5	0	Extend 6.5m left
CV102D	0.5	20.5	0	Extend 5.5m left
CV099B	1.2	17	24.96	Replace with new length of 17m

.../3

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of rip rap (m2)	Proposed works to be completed
CV099A	1.2		0	Remove culvert
CV099C	2	18.5	69.33	Replace with new length of 18.5m
CV099D	0.5		0	Remove culvert
CV099E	0.5		0	Remove culvert
CV099F	0.5	14	0	Extend 2m right
CV087B	1.2	19	24.96	Extend 6.5m left & 0.5m right
CV087A	1.2	18.5	24.96	Extend 6m left & 0.5m right
CV087C	0.5	18	0	Extend 6m right
CV079B	1.2	16.5	0	Extend 1.5m left
CV079A	1.2	16.5	0	Extend 1.5m left
CV079C	0.15		0	Remove culvert
CV079D	0.15		0	Remove culvert
CV078A	1.2	16.5	0	Extend 1.5m left
CV078B	1	19.5	0	Extend 1.5m left
CV078C	1	19.5	0	Extend 1.5m left
CV078D	2	22	0	Extend 2m right
CV076	1	11.5	0	Replace with new length of 11.5m
CV072B	1.2	17.5	0	Replace with new length of 17.5m
CV072C	1.2	17.5	0	Replace with new length of 17.5m
CV072A	1.2	17.5	0	Replace with new length of 17.5m
CV060A	1	16.5	0	Extend 1.5m left
CV060B	1	16.5	0	Extend 1.5m left
CV059B	0.5	16.5	0	Extend 3.5m left & 1m right
CV059A	0.5	16	0	Extend 3m left & 1m right
CV059C	0.5	16.5	0	Extend 4m left & 0.5m right
CV059D	0.5	16.5	0	Extend 4m left & 0.5m right
CV057B	0.5	16.5	0	Extend 1.5m left
CV057C	0.5	16.5	0	Extend 1.5m left
CV057A	0.5	16.5	0	Extend 1.5m left
BG50A	1.2	33.5	24.96	Extend 15.5m left
BG50B	1.2	32	24.96	Extend 14m left
CV049A	1.2	24.5	24.96	Extend 5.5m left & 4m right
CV049B	1.2	24.5	24.96	Extend 4.5m left & 5m right
CV030A	1	16	0	Extend 1m left
CV030B	0.5	16	0	Extend 1m left

.../4

To avoid the potential of serious harm to fish and their habitat, we are recommending that the following mitigation measures be included into your plans.

- If in-stream work is required during the open water season it should be completed in the dry by de-watering the work area and diverting and/or pumping flows around cofferdams placed at the limits of the work area.
- Existing stream flows should be maintained downstream of the de-watered work area without interruption, during all stages of the work.
- A fish stranding program should be implemented if necessary by a qualified fisheries person , who is experienced in this area, immediately following isolation and prior to de-watering to ensure that fish are removed from any dewatered area and released alive immediately downstream of the work area.
- Flow dissipaters and/or filter bags, or equivalent, should be placed at water discharge points to prevent erosion and sediment release.
- Silt or debris that has accumulated around the temporary cofferdams should be removed prior to their withdrawal.

Provided that these mitigation measures are incorporated into your plans, the Program is of the view that your proposal will not result in serious harm to fish. No formal approval is required from the Program under the *Fisheries Act* in order to proceed with your proposal.

If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please notify this office at least 10 days before starting your project. A copy of this letter should be kept on site while the work is in progress.

If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927, by fax at 867-669-4940 or by email at geogina.williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Stu Niven
Senior Fisheries Protection Biologist
Fisheries and Oceans Canada

Georgina Williston- Fisheries and Oceans Canada
Bevin LeDrew- Sikumiut Environmental Management Ltd.
Tessa Mackay- Hatch

Fisheries and Oceans Canada
Pêches et Océans Canada

Suite 301 – 5204 59th Ave.
Yellowknife NT, X1A 1E2

Our file *Notre référence*
NU-07-0050

February 20, 2015

James Millard
Environmental Manager
Baffinland Iron Mines Corp.
275 Upper Middle Road East Suite 300
Oakville, ON L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish – Mary River Project, Tote Road Realignment.

The Fisheries Protection Program of Fisheries and Oceans Canada received your proposal on February15, 2015.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act* (*SARA*).

Our review considered the following:

- Letter from Baffinland Iron Mines Re: Mary River Project – Request for Advice on Realignment of Tote Road at Culvert CV076, Km 53 Tote Road, DFO File dated February 15, 2015 and submitted by James Millard with 1 attachment.
- Attachment 1 - Mark-up of proposed field change, Drawing H349000-3000-10-012-0073

We understand that you propose to:

- Realign the existing Tote Road at Culvert CV076, 160 meters upstream from the existing crossing and install one culvert which is 1.2m in diameter and 18 m in length.
- Install culverts during the winter months when the stream is frozen to bottom.
- Remove existing culvert from the old Tote Road alignment.

Since there are no *SARA* species or their habitats identified in the project area, no additional approvals under *SARA* will be required for your proposed activities.
To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

If you have any questions, please contact Georgina Williston at our Yellowknife office at (867) 669-4927, by fax at (867) 669-4940, or by email at georgina.williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc.
Georgina Williston- Fisheries and Oceans Canada
Oliver Curran-Baffinland Iron Mines Corp.
Erik Madsen-Baffinland Iron Mines Corp.

Fisheries and Oceans Canada | Pêches et Océans Canada

5204-50th Avenue
Yellowknife, NT
X1A 1E2

Your file *Votre référence*

December 9, 2014

Our file *Notre référence*
NU-07-0050

Baffinland Iron Mines Corp.
Attention: Jim Millard, Environmental Manager
2275 Upper Middle Road, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate impacts to fish and fish habitat and listed aquatic species at risk – Mary River Project

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on November 27, 2014.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act* (*SARA*).

Our review considered the following:

- Letter from Baffinland Iron Mines RE: Realignment of Tote Road at Culvert CV099. Dated November 27, 2014 and submitted by James Millard, with 1 attachment.
- Attachment 1- Mark up of proposed field change, Drawing H349000-3000-10-012-0052

We understand that you propose to:

- Realign the existing Tote Road and install one 2 metre diameter culvert in the stream bed and two 1.2 metre overflow culverts. Culverts will be approximately 27 metres in length.

- Install culverts during the winter months when the stream is frozen to bottom.
- Remove existing culverts along the old Tote Road alignment.

Since there are no *SARA* species or their habitats identified in the project area, no additional approvals under *SARA* will be required for your proposed activities.

To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at http://www.dfo-mpo.gc.ca/pnw-ppe/measures/index-eng.html, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc. Oliver Curran- Baffinland Iron Mines
Erik Madsen – Baffinland Iron Mines

Fisheries and Oceans Canada | Pêches et Océans Canada

5204-50th Avenue
Yellowknife, NT
X1A 1E2

Your file *Votre référence*

October 27, 2014

Our file *Notre référence*
NU-07-0050

Baffinland Iron Mines Corp.
Attention : Jim Millard, Environmental Manager
2275 Upper Middle Road, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate impacts to fish and fish habitat and listed aquatic species at risk – Mary River Project

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on October 17, 2014.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act* (*SARA*).

Our review considered the following:

- Letter from Baffinland Iron Mines RE: Realignment of Tote Road at Culvert CV225B. Dated October 16, 2014 and submitted by James Millard, with 2 attachments.
- Attachment 1- Mark of proposed field change, Drawing H349000-3000-10-012-0139
- Attachment 2- Project Wide, Civil Standard Drawing, Typical Culvert Detail, H349000-1000-10-041-0003

We understand that you propose to:

- Realign the existing Tote Road and install two new 1.2 metre culverts in the stream bed and one 1.0 metre culvert 45 m away as an overflow. Culverts will be approximately 27metres in length.

- Install culverts during the winter months when the stream is frozen to bottom.
- Remove the two existing 1.2m culverts along the old Tote Road alignment.

Since there are no *SARA* species or their habitats identified in the project area, no additional approvals under *SARA* will be required for your proposed activities.

To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at http://www.dfo-mpo.gc.ca/pnw-ppe/measures/index-eng.html, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

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If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc. Oliver Curran- Baffinland Iron Mines
Erik Madsen – Baffinland Iron Mines
Stu Niven – Fisheries and Oceans Canada

APPENDIX D

OTHER SUPPORTING DOCUMENTS

APPENDIX D.1

WASTE MANAGEMENT PROGRAM 2016

2016 SUMMARY

WASTE MANAGEMENT PROGRAM

FINAL REPORT

Baffinland
Iron Mines Corporation

Mr. Jim Millard
Environmental Manager
Baffinland Iron Mines Corporation
2775 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3

February 14, 2017

O/Ref.: QE16-149-3

Confidential and priviledged document

Qikiqtaaluk environmental
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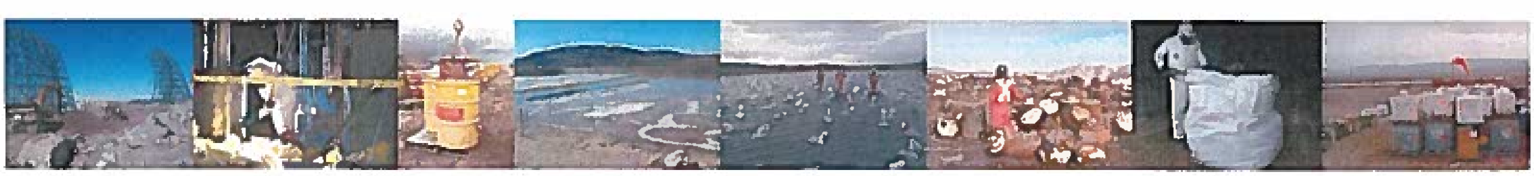

2016 Summary

Waste Management Program

FINAL REPORT

Privileged and confidential document presented to

BAFFINLAND IRON MINES CORPORATION

Prepared and verified by:

Carl Sauvageau
Project Manager

Approved by:

Benoît Dion, M.Env.
Director

Qikiqtaaluk environmental
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February 14, 2017

O/Ref.: QE16-149-3

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1. INTRODUCTION

Baffinland Iron Mines Corporation (Baffinland) is committed to remediating areas impacted by current exploration and production activities at their sites on Baffin Island. In order to comply with this objective, Qikiqtaaluk Environmental (QE) was retained to provide on-site repackaging and off-site disposal of hazardous waste from Steensby Inlet, Mary River and Milne Inlet for the 2016 season. From August 17 to September 1, 2016, QE provided Environmental Quality Assurance Specialists to ensure that the on-site repackaging, identification, labelling, and documentation of hazardous waste for off-site shipment met applicable regulatory requirements. The work was carried out at 3 locations: Steensby Inlet, Mary River and Milne Inlet. Photographs of the on-site waste staging are presented in Appendix A.

2. TRANSPORT AND DISPOSAL

Hazardous waste from the Baffinland sites was shipped via 2 different sealifts.

The first vessel departed Steensby Inlet on August 30, 2016 and arrived at the Port of Valleyfield on September 7 ,2016. The second vessel departed Milne Inlet on September 29, 2016 and arrived at the Port of Valleyfield on October 4, 2016.

At the Port of Valleyfield, hazardous materials from the 2 vessels were managed by QE on behalf of Baffinland before being transported to *MDDELCC*[1] authorized disposal facilities.

Waste materials were transported to *Solva-Rec Environnement Inc.* (*Solva-Rec*), *Campor Environnement Inc.* (*Campor*), and Delsan-AIM Environmental Services Inc., all registered disposal facilities located in the Province of Quebec.

Solva-Rec Environnement Inc.
795 Lucien-Beaudin
Saint-Jean-sur-Richelieu, Quebec J2X 5M3
Telephone: 450 347-3008
Facsimile: 450 347-1270

Campor Environnement Inc.
98 des Équipements Street
Rivière-du-Loup, Quebec G5R 5W9
Telephone: 418 867-8577

American Iron and Metal L.P.
9100 Henri-Bourassa Boulevard East
Montreal, Quebec H1E 2S4
Telephone: 514 494-2000

Environmental compliance documentation for the above disposal facilities is presented in Appendix B.

Tables 1 and 2 present the types of materials removed from the sites and their approximate volumes.

1 *Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques*

TABLE 1
Inventory of Waste Removed from Mary River and Milne Inlet in 2016

Description of waste	Transportation of Dangerous Goods Classification	Packaging	Quantity	Approximate Volume (m^3)
Waste Oil	Not TDG[1] regulated	drum[2]	99	20,295
Waste Oil	Not TDG regulated	salvage drum[3]	39	14 04
Waste Oil	Not TDG regulated	tote[4]	247	247
Used grease	Not TDG regulated	Drum	7	1.435
Used grease	Not TDG regulated	Quatrex[5]	12	9.18
Used grease	Not TDG regulated	wooden seacan	2	2
Contaminated oily solids	Not TDG regulated	drum	3	0.615
Contaminated oily solids	Not TDG regulated	salvage drum	58	20 88
Contaminated oily solids	Not TDG regulated	Quatrex	203	155.295
Contaminated oily solids	Not TDG regulated	bulks (bladders)	-	37 14 m.t
Oily sludge	Not TDG regulated	tote	1	1
Contaminated equipment	Not TDG regulated	drum	1	0.205
Contaminated equipment	Not TDG regulated	Quatrex	9	6 885
Hazardous contaminated solid	Not TDG regulated	Quatrex	15	11.475
Hazardous contaminated solid	Not TDG regulated	wooden seacan	3	3
Sulfuric acid	Corrosive substance, Class 8	Quatrex	1	0 765
Kitchen grease	Not TDG regulated	salvage drum	2	0.72
Kitchen grease	Not TDG regulated	Quatrex	25	19.89
Waste flammable liquid	Flammable liquid, Class 3	Quatrex	2	1.53
Waste flammable liquid	Flammable liquid, Class 3	drum	1	0 205
Waste flammable liquid	Flammable liquid, Class 3	tote	5	5
Oil Filters	Not TDG regulated	wooden seacan	1	1
Oil Filters	Not TDG regulated	drum	6	1 23
Oil Filters	Not TDG regulated	salvage drum	84	30 24
Filter and filtering material	Not TDG regulated	Quatrex	1	0.76
Waste batteries	Corrosive substance, Class 8	Quatrex	15	11 4
Waste batteries, potassium	Corrosive substance, Class 8	salvage drum	1	0.360
Water and glycol (-30%)	Not TDG regulated	drum	4	0.82
Water and glycol (-30%)	Not TDG regulated	salvage drum	2	0.72
Water and glycol (-30%)	Not TDG regulated	tote	17	17
Electrical waste	Not TDG regulated	Quatrex	2	1 52
Aerosols, flammable N.O.S.[6]	Flammable gas, Class 2.1	salvage drum	5	1.8
Aerosols, flammable N.O.S.	Flammable gas, Class 2.1	Quatrex	16	12.24
HC[7] contaminated water	Not TDG regulated	drum	139	28 495
HC contaminated water	Not TDG regulated	salvage drum	36	12.96
HC contaminated water	Not TDG regulated	tote	25	25
Contaminated water - untreatable	Not TDG regulated	tote	1	1
Mercury bulb and lamp	Class 9	salvage drum	1	0.360
Mercury bulb and lamp	Class 9	drum	1	0.205
Lab Pack, mixed liquid waste	Flammable liquid, Class 9	drum	1	0.205
Lab Pack, mixed liquid waste	Flammable liquid, Class 9	Quatrex	4	3.06
Ash burning	Not TDG regulated	salvage drum	7	2.52
Ash burning	Not TDG regulated	drum	11	2 255
Ash burning	Not TDG regulated	Quatrex	1	0.765
Organic solids	Not TDG regulated	salvage drum	1	0.360
Organic solids from water treatment	Not TDG regulated	Quatrex	10	7.65
Empty plastic container	Not TDG regulated	tote	64	64
Empty plastic container	Not TDG regulated	drum	21	4 305
Empty steel container	Not TDG regulated	drum	4	0 82

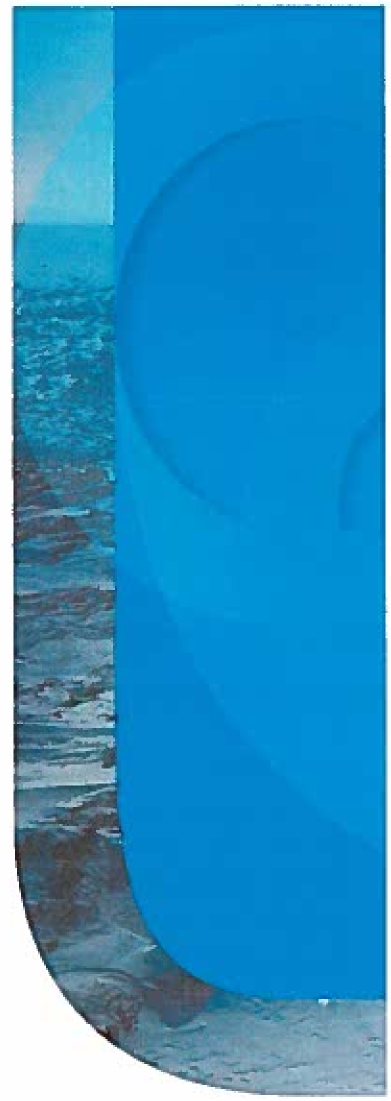
1 Transportation of Dangerous Goods
2 Assuming the volume of a drum is 0 205 m^3
3 Assuming the volume of a salvage drum is 0 360 m^3
4 Assuming the volume of a tote is 1 m^3
5 Assuming the volume of a Quatrex bag is 0 765 m^3
6 Not otherwise specified
7 Hydrocarbon

TABLE 2
Inventory of Waste Removed from Steensby Inlet in 2016

Description of Waste	Transportation of Dangerous Goods Classification	Packaging	Quantity	Approximate Volume (m^3)
Aviation jet fuel	Flammable liquid, Class 3	drum[1]	80	16.4
Diesel	Flammable liquid, Class 3	drum	1	0.205
Contaminated water - untreatable	Not TDG[2] regulated	drum	110	22.55
Ash burning	Not TDG regulated	drum	24	4.92
Organic solids	Not TDG regulated	salvage drum[3]	2	0.72
Empty steel container	Not TDG regulated	drum	144	29.52

1 Assuming the volume of a drum is 0.205 m^3
2 Transportation of Dangerous Goods
3 Assuming the volume of a salvage drum is 0.360 m^3

Certificates of recycling are presented in Appendix C.



APPENDIX A

Photographic Report

Qikiqtaaluk environmental

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BAFFINLAND IRON MINES CORPORATION
ON-SITE SUPPORT PROJECT

Property located at:
Mary River, Nunavut

Presented to.

Baffinland Iron Mines Corporation

Photo 1

Hazardous waste in preparation for off-site transport, Steensby Inlet.

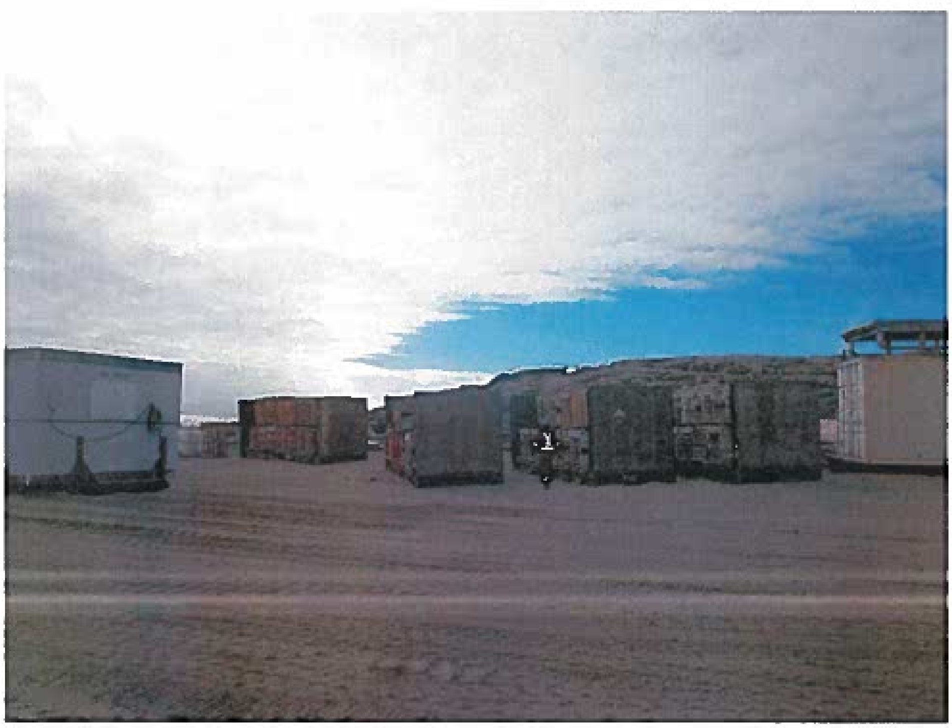

Photo 2

Hazardous waste ready to be transported by sealift, Steensby Inlet.

QE16-149-3-01.cdr

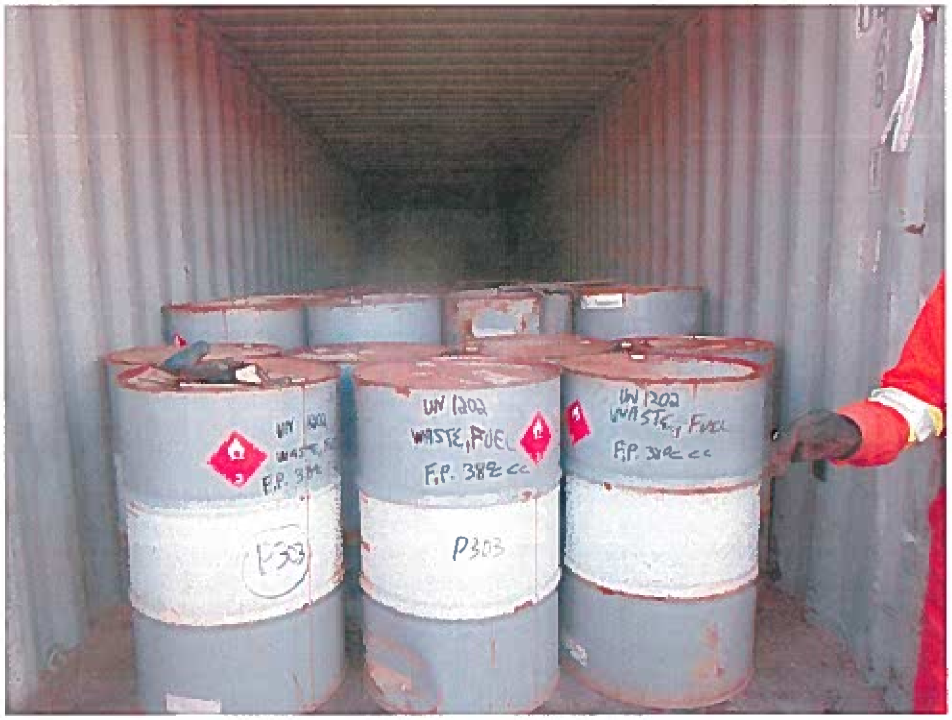

Photo 3

Labelling hazardous waste, Mary River.

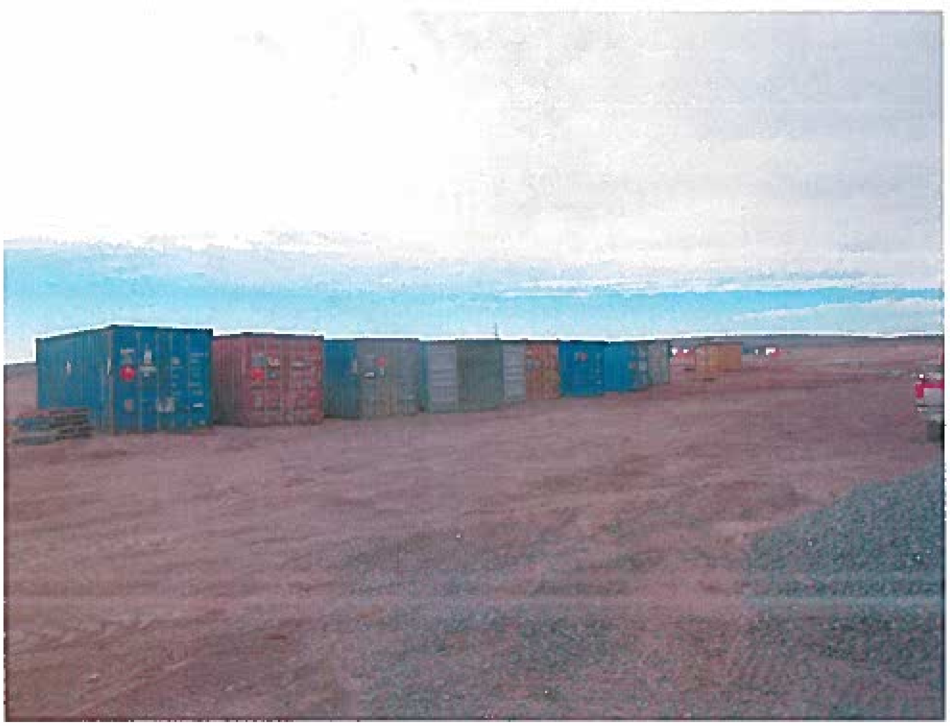

Photo 4

Packaging of containers, Mary River.

Photo 5

Packaging, marking and labelling of hazardous waste, Milne Inlet.

Photo 6

Final inspection and inventory prior to off-site transport, Milne Inlet.

APPENDIX B

Environmental Compliance Documentation

Ministère du Développement durable, de l'Environnement et des Parcs
Québec

Longueuil, le 8 septembre 2009

PERMIS

Solva-Rec Environnement inc.
420, boulevard Industriel
Saint-Jean-sur-Richelieu (Québec) J3B 4S6

N/Réf. : 7610-16-01-1060901
400631521

Objet : Exploitation d'un centre de gestion de matières dangereuses résiduelles

Mesdames,
Messieurs,

À la suite de votre demande de permis datée et reçue le 23 mars 2009, complétée le 1er septembre 2009, je délivre au titulaire ci-dessus mentionné, conformément à l'article 70.11 de la *Loi sur la qualité de l'environnement* (L.R.Q., chapitre Q-2), le présent permis d'exploitation à l'égard des activités ci-dessous :

- Entreposage d'une quantité maximale de 714 300 kg de matières dangereuses résiduelles appartenant aux catégories mentionnées à l'annexe 4 du *Règlement sur les matières dangereuses* à l'exception des matières explosives ou radioactives;
- Neutralisation d'isocyanates;
- Neutralisation d'acides et de bases;
- Broyage de néons et de contenants de matières dangereuses résiduelles;
- Vidange de contenants aérosols;
- Nettoyage de contenants et de pièces contaminées;
- Consolidation de matières dangereuses résiduelles semi-liquides.

Ces activités seront réalisées sur les lots 239 et 241 du cadastre de la paroisse de Saint-Athanase et dont l'adresse civique est le 795 rue Lucien-Beaudin à Saint-Jean-sur-Richelieu dans la municipalité régionale de comté du Haut-Richelieu.

Les documents suivants font partie intégrante du présent permis d'exploitation :

- Lettre au ministère du Développement durable, de l'Environnement et des Parcs, datée du 23 mars 2009, signée par Hughes Lamer, concernant la demande de permis d'exploitation, 16 pages et 5 annexes;

- Lettre au ministère du Développement durable, de l'Environnement et des Parcs, datée du 25 juin 2009, signée par Hughes Lamer concernant la demande de permis d'exploitation, 16 pages et 1 annexe;

- Courriels datés des 28 août, 31 août et 1er septembre 2009, envoyés par Hughes Lamer et concernant des informations additionnelles relativement à de la demande de permis.

En cas de divergence entre ces documents, l'information contenue au document le plus récent prévaudra.

Le projet devra être exploité conformément à cette demande de permis d'exploitation et à ces documents.

Ce permis d'exploitation est valide pour une durée de cinq ans à compter du 1er octobre 2009.

En outre, ce permis d'exploitation ne vous dispense pas d'obtenir toute autre autorisation requise par toute loi ou tout règlement, le cas échéant.

Pour la ministre,

PP/JL/jl

Pierre Paquin
Directeur régional
de l'analyse et de l'expertise
de l'Estrie et de la Montérégie

ANNEXE 4

(a. 11, 104, 106, 110, 113, 118, 119, 131, 132, 135, 136 et 137)

CATÉGORIES ET IDENTIFICATION DES MATIÈRES DANGEREUSES

SECTION 1

CATÉGORIES DE MATIÈRES DANGEREUSES

Code	Catégorie
	Huiles et graisses minérales ou synthétiques
A01	Huiles usées dont la concentration en BPC est ≤ 3 mg/kg
A02	Huiles usées dont la concentration en BPC est > 3 mg/kg et ≤ 50 mg/kg
A03	Eaux huileuses / émulsions
A04	Graisses usées
	Solides et boues organiques
B01	Résidus de distillation, de raffinage ou de pyrolyse de composés organiques halogénés
B02	Résidus de distillation, de raffinage ou de pyrolyse de composés organiques non halogénés
B03	Boues de sédimentation ou de décantation d'hydrocarbures
B04	Résidus de produits pétroliers et d'hydrocarbures
B05	Solides ou boues organiques générés par le traitement des eaux de procédé ou des eaux usées

B06	Boue de décantation de l'industrie de la préservation du bois et produits hors d'usage
B07	Boues et résidus de préparation pharmaceutique et produits hors d'usage
B08	Boues et résidus solides de la production de pesticides et produits hors d'usage (> 200 kg ou 200 L)
B09	Boues et résidus de la formulation et de l'utilisation d'encre, de peinture, de colorants, de laques et vernis
B10	Boues des opérations de cokéfaction
B11	Boues et résidus de la formulation et de l'utilisation de résidus, latex plastifiants, colles, adhésifs et polymères
B12	Boues et résidus des opérations de décarburation et décalaminage
B13	Autres boues et solides organiques non spécifiés autrement (précisez)
	Solvants organiques
C01	Solvants organiques halogénés (halogènes organiques totaux > 0,15%)
C02	Solvants organiques non halogénés (halogènes organiques totaux ≤ 0,15%)
C03	CFC utilisé comme solvant et nettoyeur
	Solutions organiques
D01	Antigels, fluides de frein et hydraulique
D02	Autres solutions organiques (précisez)
	Solides et boues inorganiques
E01	Boues des opérations de traitement et revêtement de surface non spécifié autrement
E02	Catalyseurs usés
E03	Boues et résidus contenant des métaux
E04	Poussières métalliques
E05	Sels métalliques de trempages ou non
E06	Sels non métalliques de trempage ou non
E07	Anodes et cathodes usés

E08	Cendres
E09	Laitiers, écumes, écailles, gâteaux provenant de la production primaire des métaux
E10	Scories
E11	Sables de fonderie
E12	Filtres et matières filtrantes
E13	Solides, poussières ou boues générés par les systèmes d'épuration d'air
E14	Solides ou boues inorganiques générés par les systèmes d'épuration des eaux de procédé ou des eaux usées
E15	Batteries au plomb
E16	Batteries et autres accumulateurs
E17	Boues et résidus de la production, la formulation et l'utilisation de pigments inorganiques
E18	Boues de fluorure de calcium
E19	Sable de décapage usé
E20	Gypse issu de procédés industriels
E21	Verres activés (tubes cathodiques et autres)
E22	Autres boues et solides inorganiques non spécifiés autrement (précisez)
	Solutions aqueuses inorganiques
F01	Solutions usées de traitement et de revêtement de surface non spécifiées autrement
F02	Solutions et saumures contenant des cyanures, des sulfures, des nitrures
F03	Autres solutions inorganiques et saumures aqueuses (précisez)
	Matières dangereuses acides (pH < 2)
G01	Liquides ou boues acides organiques
G02	Liquides ou boues acides inorganiques
G03	Autres matières acides (précisez)

	Matières dangereuses caustiques (pH > 12,5)
H01	Liquides ou boues alcalines inorganiques
H02	Liquides ou boues alcalines organiques
H03	Autes matières alcalines (précisez)
	Matières et objets contenant des BPC ou contaminés par des BPC
J01	Liquides contenant des BPC à une concentration comprise entre 50 mg/kg et 10 000 mg/kg (1%)
J02	Liquides contenant des BPC à une concentration supérieure ou égale à 10 000 mg/kg (1%)
J03	Solides contenant des BPC à une concentration comprise entre 50 mg/kg et 10 000 mg/kg (1%)
J04	Solides contenant des BPC à une concentration supérieure ou égale à 10 000 mg/kg (1%)
J05	Substances contenant des BPC à une concentration comprise entre 50 mg/kg et 10 000 mg/kg (1%)
J06	Substances contenant des BPC à une concentration supérieure ou égale à 10 000 mg/kg (1%)
J07	Équipement contenant des BPC
J08	Équipement contaminé par des BPC
J09	Pièce métallique à nu contaminée par des BPC
	Matières dangereuses provenant d'un laboratoire
K01	Laboratoire de recherche ou de développement industriel ou commercial
K02	Laboratoire d'un établissement d'enseignement
K03	Autres sources (précisez)
	Matières dangereuses contaminées
L01	Équipements contaminés
L02	Contenants contaminés
L03	Autres matières contaminées

	Autres matières dangereuses
M01	Préparations pharmaceutiques, médicaments et cosmétiques hors d'usage
M02	Boues et résidus de tanneries
M03	Matières explosives non spécifiées autrement
M04	Matières radioactives non spécifiées autrement
M05	Boues de récurage et de décontamination de réservoirs et contenants non spécifiées autrement
M06	Résines échangeuses d'ions hors d'usage
M07	Autres matières non spécifiées autrement (précisez)

	Mélanges (catégories réservées aux titulaires de permis visés à l'article 70.9 de la Loi sur la qualité de l'environnement (L.R.Q., c. Q-2))
N01	Mélange acide
N02	Mélange acide à réduire
N03	Mélange neutre
N04	Mélange alcalin
N05	Mélange alcalin/neutre à réduire
N06	Mélange à oxyder
N07	Mélange oxydant
N08	Combustible à faible valeur calorifique
N09	Combustible à faible valeur calorifique, halogéné
N10	Combustible à haute valeur calorifique
N11	Combustible à haute valeur calorifique, halogéné
N12	Mélange de solvants organiques
N13	Mélange de solutions organiques
N14	Mélange de boues et solides organiques
N15	Mélange de boues et solides inorganiques

N16	Mélange de solides organiques et inorganiques
	Autres matières composant un mélange (catégories réservées aux titulaires de permis visés à l'article 70.9 de la Loi sur la qualité de l'environnement)
O01	Sols contaminés
O02	Matières non dangereuses

SECTION 2

IDENTIFICATION DE LA MATIÈRE DANGEREUSE

L'identification d'une matière dangereuse est déterminée par le code de sa catégorie, indiqué à la section 1 de la présente annexe, accompagné des numéros de sa classe et de sa division, tels qu'attribués en vertu du Règlement sur le transport des matières dangereuses (D. 866-2002, 02-07-10) (si la matière dangereuse n'est pas visée par ce dernier règlement, on utilisera alors le code 0.0), ainsi que par le code indiquant son état physique tel que déterminé selon le tableau suivant:

Code	État physique
L	Liquide
S	Solide
P	Semi-solide (boue)
G	Gazeux

D. 1310-97, ann. 4.

Ministère
du Développement durable,
de l'Environnement
et de la Lutte contre les
changements climatiques
Québec

Longueuil, le 8 septembre 2014

PERMIS
Loi sur la qualité de l'environnement
(RLRQ, chapitre Q-2, article 70.11)

Solva-Rec Environnement Inc.
795, rue Lucien-Beaudin
Saint-Jean-sur-Richelieu (Québec) J2X 5M3

N/Réf. : 7610-16-01-1060901
401172445

Objet : Exploitation d'un centre de gestion de matières dangereuses résiduelles

Mesdames,
Messieurs,

À la suite de votre demande de renouvellement de permis du 24 mai 2014, reçue le 3 juin 2014 et complétée le 5 septembre 2014, je délivre au titulaire mentionné ci-dessus, conformément à l'article 70.11 de la *Loi sur la qualité de l'environnement* (RLRQ, chapitre Q-2), le permis à l'égard de l'activité décrite ci-dessous :

- Entreposage d'une quantité maximale de 2 713 425 kg de matières dangereuses résiduelles appartenant aux catégories mentionnées à l'annexe 4 du *Règlement sur les matières dangereuses* à l'exception des matières explosives ou radioactives;
- Neutralisation d'isocyanates;
- Neutralisation d'acides et de bases;
- Broyage de néons et de contenants de matières dangereuses résiduelles;
- Vidange de contenants aérosols;
- Nettoyage de contenants et de pièces contaminées;
- Consolidation de matières dangereuses résiduelles semi-liquides.

Ce projet est situé à l'emplacement mentionné ci-après :

> Sur le lot 4 043 276 du cadastre du Québec (anciennement les lots 239 et 241 du cadastre officiel de la paroisse de Saint-Athanase), municipalité régionale de comté du Haut-Richelieu, dont l'adresse civique est le 795, rue Lucien-Beaudin, dans la municipalité de Saint-Jean-sur-Richelieu.

Les documents suivants font partie intégrante du présent permis :

- Lettre et documents transmis au ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques, datée du 24 mai 2014 et signée par Hugues Lamer, concernant la demande de renouvellement de permis;
- Courriel transmis le 3 septembre 2014 au ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques par Éric Benoît, concernant des précisions sur les activités d'entreposage effectuées à l'extérieur et sur des informations techniques;
- Lettre et documents transmis le 5 septembre 2014 au ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques par Hugues Lamer, concernant des informations techniques et les engagements du détecteur de COV, des registres et de l'entreposage de MDR à l'extérieur sur le terrain.

En cas de divergence entre ces documents, l'information contenue au document le plus récent prévaudra.

Le projet devra être réalisé et exploité conformément à ces documents.

Ce permis est valide pour cinq ans à compter du 8 septembre 2014, conformément à l'article 70.14 de ladite loi.

En outre, ce permis ne dispense pas le titulaire d'obtenir toute autre autorisation requise par toute loi ou tout règlement, le cas échéant.

Pour le ministre,

PP/AM/am

Pierre Paquin
Directeur régional de l'analyse et de l'expertise de l'Estrie et de la Montérégie

Ministère du Développement durable, de l'Environnement et des Parcs
Québec

Longueuil, le 5 décembre 2011

PERMIS

Solva-Rec Environnement inc.
795, rue Lucien-Beaudin
Saint-Jean-sur-Richelieu (Québec) J2X 5M3

N/Réf. : 7610-16-01-1060903
400878209

Objet : Système de gestion de transport de matières dangereuses résiduelles

Mesdames,
Messieurs,

À la suite de votre demande de renouvellement de permis datée du 7 août 2011, reçue le 18 août 2011 et complétée le 23 novembre 2011, je délivre au titulaire ci-dessus mentionné, conformément aux articles 70.9-5 et 70.14 de la *Loi sur la qualité de l'environnement* (L.R.Q., chapitre Q-2), le permis à l'égard de l'activité ci-dessous :

> Transport de matières dangereuses résiduelles vers un lieu d'élimination. Les matières dangereuses résiduelles transportées seront solides, liquides ou semi solides et appartiendront aux catégories mentionnées à l'annexe 4 du *Règlement sur les matières dangereuses* à l'exception des matières et objets contenant des BPC et des matières explosives ou radioactives.

Les véhicules servant au transport de matières dangereuses résiduelles seront remisés à l'adresse suivante :

795, rue Lucien-Beaudin
Saint-Jean-sur-Richelieu

Le document suivant fait partie intégrante du présent permis :

- Lettre adressée au ministère du Développement durable, de l'Environnement et des Parcs, datée du 7 août 2011, signée par Hugues Lamer, concernant la demande de renouvellement du permis d'exploitation, 2 pages, 4 annexes.

Le projet devra être exploité conformément à cette demande de renouvellement de permis et à ce document.

Ce permis est valide pour cinq ans à compter de la date des présentes.

En outre, ce permis ne vous dispense pas d'obtenir toute autre autorisation requise par toute loi ou tout règlement, le cas échéant.

Pour le ministre,

PP/JL/jl

Pierre Paquin
Directeur régional de l'analyse et de
l'expertise de l'Estrie et de la Montérégie

Ministère
du Développement durable,
de l'Environnement
et de la Lutte contre les
changements climatiques
Québec

Rimouski, le 6 mai 2014

PERMIS
Loi sur la qualité de l'environnement
(RLRQ, chapitre Q-2, article 70.11)

Campor Environnement inc.
98, rue des Équipements
Rivière-du-Loup (Québec) G5R 5W9

N/Réf. : 7610-01-01-0278858
401130335

Objet : Transport de matières dangereuses vers un lieu d'élimination

Mesdames,
Messieurs,

À la suite de votre demande de permis du 13 mars 2014, reçue le 24 avril 2014 et complétée le 5 mai 2014, je délivre au titulaire mentionné ci-dessus, conformément à l'article 70.11 de la *Loi sur la qualité de l'environnement* (RLRQ, chapitre Q-2), le permis à l'égard de l'activité décrite ci-dessous :

> Transport de matières dangereuses vers un lieu d'élimination.
> Les matières dangereuses visées sont celles listées à l'annexe 4 du *Règlement sur les matières dangereuses* (Q-2, r. 32).

Les lieux de remisage de ce système de transport sont situés aux emplacements ci-après :

- 98, des Équipements, Rivière-du-Loup, G5R 5W9
- 2378, de la Rotonde, Charny, G4X 3C3

Les documents suivants font partie intégrante du présent permis :

- Demande de permis pour le transport de matières dangereuses vers un lieu d'élimination, datée et signée le 13 mars 2014 par Raymond Boisvert, 6 pages et annexes.
- Renseignements supplémentaires reçus par courriel de la part de Raymond Boisvert, datés du 5 mai 2014, 1 page.

En cas de divergence entre ces documents, l'information contenue au document le plus récent prévaudra.

Le projet devra être réalisé et exploité conformément à ces documents.

Ce permis est valide pour cinq ans à compter de la date des présentes, conformément à l'article 70.14 de ladite loi.

En outre, ce permis ne dispense pas le titulaire d'obtenir toute autorisation requise par toute loi ou tout règlement, le cas échéant.

Pour le ministre,

JMD/IB/dl

Jean-Marie Dionne
Directeur régional de l'analyse et de l'expertise du Bas-Saint-Laurent et de la Gaspésie–Îles-de-la-Madeleine

Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs
Québec

Rimouski, le 13 mars 2013

PERMIS
Loi sur la qualité de l'environnement
(RLRQ, chapitre Q-2, article 70.9)

Campor inc.
98, rue des Équipements
Rivière-du-Loup (Québec) G5R 5W9

N/Réf. : 7610-01-01-0278811
401013043

Objet : Gestion, entreposage et traitement de matières dangereuses résiduelles après en avoir pris possession

Mesdames,
Messieurs,

À la suite de votre demande de renouvellement de permis datée du 11 janvier 2013, reçue le 17 janvier 2013 et complétée le 21 février 2013, je délivre au titulaire mentionné ci-dessus, conformément à l'article 70.9 de la *Loi sur la qualité de l'environnement* (RLRQ, chapitre Q-2), le permis à l'égard des activités décrites ci-dessous :

L'entreposage, après en avoir pris possession à cette fin, de matières dangereuses résiduelles appartenant aux catégories mentionnées à l'annexe 4 du *Règlement sur les matières dangereuses* (Q-2, r. 32). La capacité maximale d'entreposage sera de 1 555 160 kilogrammes.

Les principales activités de traitement de matières dangereuses résiduelles qui seront réalisées se résument comme suit :

- traitement d'huiles usées dans le but de les revendre à des fins énergétiques;
- traitement d'eaux contaminées dangereuses;
- perforation de canettes aérosol.

Ces activités se dérouleront sur le lot 4 058 510 du cadastre du Québec, ville de Rivière-du-Loup, municipalité régionale de comté de Rivière-du-Loup.

Les documents suivants font partie intégrante du présent permis :

- Demande de renouvellement de permis datée et signée le 11 janvier 2013 par Raymond Boisvert, coordonnateur environnement, et reçue le 17 janvier 2013, 5 pages et annexes.
- Renseignements supplémentaires datés et signés le 5 février 2013 par Raymond Boisvert, coordonnateur environnement, 1 page.
- Renseignements supplémentaires datés et signés le 20 février 2013 par Raymond Boisvert, coordonnateur environnement, et reçus le 21 février 2013, 2 pages et annexes.

En cas de divergence entre ces documents, l'information contenue au document le plus récent prévaudra.

Le projet devra être réalisé et exploité conformément à ces documents.

Ce permis est valide pour une durée de cinq ans à compter de la date des présentes.

En outre, ce permis ne dispense pas le titulaire d'obtenir toute autre autorisation requise par toute loi ou tout règlement, le cas échéant.

Pour le ministre,

JMD/AL/dl

Jean-Marie Dionne
Directeur régional de l'analyse et
de l'expertise du Bas-Saint-Laurent et
de la Gaspésie–Îles-de-la-Madeleine

Ministère du Développement durable, de l'Environnement et des Parcs
Québec

Charlesbourg, le 11 novembre 2005

CERTIFICAT D'AUTORISATION

La Compagnie Américaine de Fer et Métaux inc. (A.I.M.)
999, avenue Industrielle
Québec (Québec) G1J 3W1

N/Réf. : 7610-03-01027-01-1
N/Interv. : 300212143

Objet : Exploitation d'une entreprise de récupération et recyclage de métaux non ferreux et d'accumulateurs au plomb

Mesdames,
Messieurs,

À la suite de votre demande de certificat d'autorisation datée du 14 mars 2005, reçue le 17 mars 2005 et complétée le 1er novembre 2005, j'autorise, conformément à l'article 22 de la Loi sur la qualité de l'environnement (L.R.Q., chapitre Q-2), le titulaire ci-dessus mentionné à réaliser le projet décrit ci-dessous :

> Exploiter une entreprise de récupération et recyclage de métaux non ferreux en vrac et d'accumulateurs au plomb, comprenant une presse pour la mise en ballots des métaux et un système d'épuration atmosphérique qui lui est rattaché, ainsi que des aires d'entreposage et de transbordement étanches ou équipées de système de récupération des fluides, pour une capacité annuelle maximale de production de 16 500 tonnes de métaux non ferreux et de 480 tonnes d'accumulateurs au plomb, dont la quantité de matières dangereuses résiduelles entreposées, incluant lesdits accumulateurs, sera inférieure en tout temps à 40 000 kg.
>
> Ces installations seront exploitées sur le lot 2 337 946 du cadastre rénové de la province de Québec, dans l'arrondissement Limoilou de la ville de Québec, Communauté métropolitaine de Québec.

N/Réf. : 7610-03-01027-01-1
N/Interv. : 300212143

Le 11 novembre 2005

Les documents suivants font partie intégrante du présent certificat d'autori-sation :

- Formulaire général de demande de certificat d'autorisation pour un projet industriel, en vertu de l'article 22 de la *Loi sur la qualité de l'environnement, L.R.Q, chapitre Q-2*, reçu sans lettre d'accompagnement le 17 mars 2005, signé par M. Robert Richard, coordonnateur environnement, en date du 14 mars 2005 et auquel étaient rattachées neuf annexes numérotées comprenant, outre certains documents administratifs nécessaires, des plans, devis, croquis des lieux et notes techniques;
- Lettre au ministère du Développement durable, de l'Environnement et des Parcs, reçue le 30 août 2005, signée en date du 25 août 2005 par M. Robert Richard, coordonnateur environnement, apportant des informations techniques, à laquelle étaient rattachés, outre certains documents administratifs nécessaires, les documents suivants :
  - Plan du manufacturier Audet Soudure (1989) inc. intitulé « RÉSERVOIR SURFACE DOUBLE PAROI », dessin n° N-4331, feuille 1 de 1, mesures au plan, vérifié, signé et scellé par un vérificateur de la firme Génécor inc., en date du 31 mars 2003, présentant des vues en plan et en coupe du réservoir;
  - Plan du manufacturier Audet Soudure (1989) inc. intitulé « RÉSERVOIR D'HUILE DOMESTIQUE À PLAT», dessin n° N-4332, feuille 1 de 1, mesures au plan, vérifié, signé et scellé par un vérificateur de la firme Génécor inc., en date du 23 avril 2003, présentant des vues en plan et en coupe du réservoir;
  - Fiche technique du manufacturier Capteur GR inc. intitulé « INTERCEPTEUR D'HUILE À CAPACITÉ DE RÉTENTION VARIABLE », mesures au plan, vérifié, signé et scellé par un vérificateur de la firme Génécor inc., en date du 31 mars 2003, présentant une vue en coupe du réservoir et le devis de conception;
  - Fiches techniques du manufacturier AAF International pour les filtres de marque AmAir® 300X et Perfect Pleat® ULTRA du dépoussiéreur de la presse à métaux;
  - Télécopie d'une lettre signée en date du 4 juin 2005 par M. Pierre Gauvin de Solutions Environnementales M.P.M. confirmant la récupération des matières dangereuses résiduelles par son entreprise chez A.I.M. Québec inc.;
  - Plan général de l'aménagement du site intitulé « A.I.M. QUEBEC », dessin n° QTER-001-D, à l'échelle 1:500, daté du 15 février 2005, vérifié, signé et scellé par M. Pierre Martin, architecte, de la firme Gerpatec inc. de Québec;

N/Réf. : 7610-03-01027-01-1
N/Interv. : 300212143

Le 11 novembre 2005

- Plan du détail des structures métalliques intitulé « MÉTAUX OUVRÉS », dossier n° 0232, feuille 16/21, échelles au plan, daté de novembre 2002, vérifié, signé et scellé par M. Pierre Martin, architecte, de la firme Gerpatec inc. de Québec;

- Plan général de l'aménagement intérieur du bâtiment intitulé « PLOMBERIE – VUE EN PLAN NIVEAU 1 – DRAINAGE ET ALIMENTATION », dossier n° 2002-LS-63, feuille P-1/4, à l'échelle 1:100, daté du 26 février 2002, vérifié, signé et scellé par M. Robert Devost, ingénieur, de la firme Génécor inc. de Québec;

- Plan général de l'aménagement intérieur du bâtiment intitulé « PLOMBERIE - 1[ER] ET 2[IÈME] ÉTAGES – DRAINAGE ET ALIMENTATION – DÉTAILS ET LÉGENDE », dossier n° 2002-LS-63, feuille P-2/4, échelles au plan, daté du 26 février 2002, vérifié, signé et scellé par M. Robert Devost, ingénieur, de la firme Génécor inc. de Québec;

- Lettre au ministère du Développement durable, de l'Environnement et des Parcs reçue le 4 octobre 2005, signée en date du 30 septembre 2005 par M. Robert Richard, coordonnateur environnement, à laquelle était rattaché, outre un document administratif nécessaire, le document pertinent suivant :

  - Lettre au ministère du Développement durable, de l'Environnement et des Parcs, signée en date du 26 septembre 2005 par M. Robert Richard, coordonnateur environnement, présentant un engagement à ne pas entreposer, presser, démanteler ou déchiqueter des véhicules hors d'usage à ses installations;

- Lettre au ministère du Développement durable, de l'Environnement et des Parcs, reçue le 1[er] novembre 2005, signée en date du 31 octobre 2005 par M. Robert Richard, coordonnateur environnement, à laquelle étaient rattachés les documents pertinents suivants :

  - Formulaire 8.2.2.1 de demande d'autorisation pour l'installation d'un dépoussiéreur à filtres, signé par M. Robert Richard, coordonnateur environnement, en date du 31 octobre 2005;

  - Document intitulé « RAPPORT PRÉLIMINAIRE – ÉCHANTILLONAGE DES ÉMISSIONS ATMOSPHÉRIQUES – PRESSE À MÉTAUX – AIM-QUÉBEC », n° 05-00960, préparé par la firme Consulair de Québec, daté d'octobre 2005, présentant les résultats d'échantillonnage isocinétiques à la sortie de la cheminée.

En cas de divergence entre ces documents, l'information contenue au document le plus récent prévaudra.

N/Réf. : 7610-03-01027-01-1
N/Interv. : 300212143

Le 11 novembre 2005

Le projet devra être réalisé et exploité conformément à ces documents.

En outre, ce certificat d'autorisation ne dispense pas le titulaire d'obtenir toute autre autorisation requise par toute loi ou tout règlement le cas échéant.

Pour le ministre,

LM/LR/mg

Lise Monette
Directrice régionale de l'analyse et de l'expertise de la Capitale-Nationale et de la Chaudière-Appalaches

Ministère du Développement durable, de l'Environnement et des Parcs
Québec

Québec, le 29 avril 2009

CESSION DE CERTIFICAT D'AUTORISATION

Fer et Métaux Américains S.E.C.
9100, boulevard Henri-Bourassa Est
Montréal (Québec) H1E 2S4

N/Réf. : 7610-03-01027-01-6
N/Doc. : 400580354

Objet : Exploitation d'une entreprise de récupération et recyclage de métaux non ferreux et d'accumulateurs au plomb

Mesdames,
Messieurs,

À la suite de votre demande de cession datée du 21 avril 2009, reçue et complétée le 22 avril 2009, concernant le certificat d'autorisation délivré en vertu de l'article 22 de la Loi sur la qualité de l'environnement (L.R.Q., chapitre Q-2), le 11 novembre 2005 à La Compagnie Américaine de Fer et Métaux inc., j'autorise, conformément au deuxième alinéa de l'article 24 de la Loi sur la qualité de l'environnement, la cession de ce certificat d'autorisation à la compagnie Fer et Métaux Américains S.E.C.

Cette cession est délivrée à l'égard du projet décrit ci-dessous :

> Exploiter une entreprise de récupération et recyclage de métaux non ferreux en vrac et d'accumulateurs au plomb, comprenant une presse pour la mise en ballots des métaux et un système d'épuration atmosphérique qui lui est rattaché, ainsi que des aires d'entreposage et de transbordement étanches ou équipées de système de récupération des fluides, pour une capacité annuelle maximale de production de 16 500 tonnes de métaux non ferreux et de 480 tonnes d'accumulateurs au plomb, dont la quantité de

N/Réf. : 7610-03-01027-01-6
N/Doc. : 400580354

Le 29 avril 2009

matières dangereuses résiduelles entreposées, incluant lesdits accumulateurs, sera inférieure en tout temps à 40 000 kg.

Ces installations seront exploitées sur le lot 2 337 946 du cadastre rénové de la province de Québec, dans l'arrondissement Limoilou de la ville de Québec, Communauté métropolitaine de Québec.

Les documents suivants font partie intégrante de la présente cession de certificat d'autorisation :

- Lettre acheminée au ministère du Développement durable, de l'Environnement et des Parcs, signée le 21 avril 2009 par M. Mathieu Germain de Fer et Métaux Américains S.E.C., 2 pages, concernant l'engagement à respecter le certificat d'autorisation en plus des documents joints.

Le projet devra être réalisé et exploité conformément au certificat d'autorisation cédé, aux documents qui en faisaient partie, à la demande de cession et aux documents qui font partie intégrante de cette cession de certificat d'autorisation et aux conditions de cette cession.

En outre, cette cession de certificat d'autorisation ne dispense pas le titulaire d'obtenir toute autre autorisation requise par toute loi ou tout règlement le cas échéant.

Pour la ministre,

JML/MCL/nr

Jean-Marc Lachance, ing.
Directeur régional de l'analyse et
de l'expertise de la Capitale-Nationale
et de la Chaudière-Appalaches

Copie certifiée conforme remise à la compagnie La Compagnie Américaine de Fer et Métaux inc.

APPENDIX C

Certificates of Recycling

Solva-Rec Environnement

Date
18/10/2016
Certificat de traitement
027495

Certificat de traitement des matières résiduelles dangereuses

Nom du client:

Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily solids for landfill	L03-0.0-S	14,18	TM	14 180,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste

18/10/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
26/10/2016
Certificat de traitement
027627

Certificat de traitement des matières résiduelles dangereu

Nom du client:

Baffinland Iron Mines - Mary River Proj

Adresse:

2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily solids for landfill	L03-0.0-S	22,96	TM	22 960,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

26/10/2016
Date

Solva Rec Environnement

Date
14/11/2016
Certificat de traitement
027737

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Glycol and water (-30%)	D01-0.0-L	3,00	TOTE	2 889,00
Oily contaminated sorbent	L03-0.0-S	3,00	QUATREX	987,00
Oily water and emulsion	A03-0.0-L	3,00	TOTE	2 976,00
Steel empty container	L02-0.0-S	4,00	BARIL205	181,00
Hazardous contaminated solid	M07-0.0-S	3,00	M3	1 083,00
Empty plastic container	L02-0.0-S	2,00	TOTE	110,00
Glycol and water (-30%)	D01-0.0-L	1,00	BARIL205	179,00
Used grease	A04-0.0-P	1,00	BARIL205	68,00
Oily water and emulsion	A03-0.0-L	2,00	BARIL205	357,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

14/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva Rec Environnement

Date
18/11/2016
Certificat de traitement
027775

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Environmental dangerous liquid lab pack	K03-9.0-L	1,00	QUATREX	112,00
Glycol and water (-30%)	D01-0.0-L	1,00	TOTE	943,00
Oily contaminated sorbent	L03-0.0-S	6,00	QUATREX	1 355,00
Oily contaminated sorbent	L03-0.0-S	4,00	OVER-SIZE	878,00
Oily water and emulsion	A03-0.0-L	1,00	TOTE	882,00
Ashes	E08-0.0-S	6,00	OVER-SIZE	1 281,00
Empty plastic container	L02-0.0-S	27,00	TOTE	2 329,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

18/11/2016
Date

Solva-Rec Environnement

Date
23/11/2016
Certificat de traitement
027788

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	20,00	QUATREX	4 800,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

23/11/2016
Date

Solva-Rec Environnement

Date
15/11/2016
Certificat de traitement
027742

Certificat de traitement des matières résiduelles dangereuses

Nom du client:

Baffinland Iron Mines - Mary River Proj
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Cooking oil	D02-0.0-L	20,00	QUATREX	6 770,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

15/11/2016
Date

Solva-Rec Environnement

Date
14/11/2016
Certificat de traitement
027736

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	22,00	QUATREX	4 450,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE
Sébastien Leclerc
2012-220
QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

14/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
25/10/2016
Certificat de traitement
027540

Certificat de traitement des matières résiduelles dangereu

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	3,00	OVER-SIZE	516,00
Oily contaminated sorbent	L03-0.0-S	7,00	QUATREX	1 186,00
Filter and filtering material	E12-0.0-S	1,00	QUATREX	260,00
E-waste	L01-0.0-S	1,00	QUATREX	145,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

25/10/2016
Date

Solva-Rec Environnement

Date
27/10/2016
Certificat de traitement
027556

Certificat de traitement des matières résiduelles dangereu:

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Empty plastic container	L02-0.0-S	6,00	BARIL205	176,00
Oily contaminated sorbent	L03-0.0-S	11,00	QUATREX	1 708,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

27/10/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
31/10/2016
Certificat de traitement
027566

Certificat de traitement des matières résiduelles dangereu:

Nom du client:

Baffinland Iron Mines - Mary River Proj.

Adresse:

2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Flammable liquid	C02-3.0-L	4,00	TOTE	3 672,00
Oily water and emulsion	A03-0.0-L	18,00	BARIL205	3 306,00
Oily water and emulsion	A03-0.0-L	3,00	TOTE	2 391,00
Glycol and water (-30%)	D01-0.0-L	1,00	TOTE	1 086,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

31/10/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
26/10/2016
Certificat de traitement
027549

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oil filter	A05-0.0-S	1,00	BARIL205	134,00
Oil filter	A05-0.0-S	8,00	OVER-SIZE	1 210,00
Oily contaminated sorbent	L03-0.0-S	9,00	OVER-SIZE	1 233,00
Oily water and emulsion	A03-0.0-L	2,00	OVER-SIZE	447,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste

26/10/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
28/10/2016
Certificat de traitement
027560

Certificat de traitement des matières résiduelles dangereu

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oil filter	A05-0.0-S	20,00	OVER-SIZE	3 121,00
Oily contaminated sorbent	L03-0.0-S	10,00	QUATREX	2 099,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

28/10/2016
Date

Solva-Rec Environnement

Date
27/10/2016
Certificat de traitement
027553

Certificat de traitement des matières résiduelles dangereu:

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oil filter	A05-0.0-S	1,00	BARIL205	78,00
Oil filter	A05-0.0-S	5,00	OVER-SIZE	752,00
Oily contaminated sorbent	L03-0.0-S	4,00	OVER-SIZE	672,00
Oily contaminated sorbent	L03-0.0-S	10,00	QUATREX	1 488,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste /
Isabelle Rajotte, Chimiste

27/10/2016
Date

Solva-Rec Environnement

Date
25/10/2016
Certificat de traitement
027536

Certificat de traitement des matières résiduelles dangereu

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily water and emulsion	A03-0.0-L	39,00	BARIL205	7 750,00
Oily water and emulsion	A03-0.0-L	1,00	OVER-SIZE	241,00
Oily contaminated sorbent	L03-0.0-S	2,00	QUATREX	281,00
Oily water and emulsion	A03-0.0-L	1,00	TOTE	1 091,00
Glycol and water (-30%)	D01-0.0-L	2,00	TOTE	2 120,00
Oily sludge	B04-0.0-P	1,00	TOTE	417,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE
Isabelle Rajotte
2015-146
QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

25/10/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
25/10/2016
Certificat de traitement
027572

Certificat de traitement des matières résiduelles dangereu:

Nom du client:
Baffinland Iron Mines - Mary River Proj
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Environmental dangerous liquid lab pack	K03-9.0-L	2,00	QUATREX	1 430,00
Hazardous contaminated solid	M07-0.0-S	1,00	QUATREX	128,00
Oily contaminated sorbent	L03-0.0-S	6,00	QUATREX	1 465,00
Glycol and water (-30%)	D01-0.0-L	2,00	TOTE	1 621,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2016-148 QUÉBEC

25/10/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
31/10/2016
Certificat de traitement
027570

Certificat de traitement des matières résiduelles dangereu:

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	5,00	QUATREX	1 050,00
Used grease	A04-0.0-P	1,00	QUATREX	895,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

31/10/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
01/11/2016
Certificat de traitement
027571

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily water and emulsion	A03-0.0-L	5,00	TOTE	5 216,00
Glycol and water (-30%)	D01-0.0-L	4,00	TOTE	4 351,00
Contaminated water untreatable	F03-0.0-L	1,00	TOTE	1 043,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

01/11/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
27/10/2016
Certificat de traitement
027557

Certificat de traitement des matières résiduelles dangereu:

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily water and emulsion	A03-0.0-L	6,00	BARIL205	1 209,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

27/10/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva Rec Environnement

Date
28/10/2016
Certificat de traitement
027558

Certificat de traitement des matières résiduelles dangereu:

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel : (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily water and emulsion	A03-0.0-L	4,00	BARIL205	728,00
Oily water and emulsion	A03-0.0-L	3,00	OVER-SIZE	513,00
Oily contaminated sorbent	L03-0.0-S	5,00	OVER-SIZE	992,00
Oil filter	A05-0.0-S	7,00	OVER-SIZE	1 103,00
Oily contaminated sorbent	L03-0.0-S	1,00	QUATREX	182,00
Used grease	A04-0.0-P	6,00	QUATREX	1 959,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

28/10/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
25/10/2016
Certificat de traitement
027537

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily water and emulsion	A03-0.0-L	16,00	BARIL205	3 401,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste

CHIMISTE Isabelle Bajotte 2015-146 QUÉBEC

25/10/2016
Date

Solva-Rec Environnement

Date
26/10/2016
Certificat de traitement
027542

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily water and emulsion	A03-0.0-L	12,00	BARIL205	2 745,00
Oily water and emulsion	A03-0.0-L	1,00	OVER-SIZE	229,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

26/10/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
08/11/2016
Certificat de traitement
027632

Certificat de traitement des matières résiduelles dangereuses

Nom du client
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Glycol and water (-30%)	D01-0.0-L	3,00	TOTE	2 968,00
Empty plastic container	L02-0.0-S	8,00	TOTE	506,00
Empty plastic container	L02-0.0-S	5,00	BARIL205	100,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

08/11/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
09/11/2016
Certificat de traitement
027637

Certificat de traitement des matières résiduelles dangereuses

Nom du client:

Baffinland Iron Mines - Mary River Proj.

Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	2,00	QUATREX	258,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

09/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
09/11/2016
Certificat de traitement
027639

Certificat de traitement des matières résiduelles dangereuses

Nom du client:

Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	10,00	QUATREX	2 133,00
Oil filter	A05-0.0-S	2,00	BARIL205	226,00
Oil filter	A05-0.0-S	3,00	OVER-SIZE	398,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

09/11/2016
Date

Solva-Rec Environnement

Date
08/11/2016
Certificat de traitement
027630

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Lead battery	E15-8.0-S	1,00	QUATREX	842,00
Oily contaminated sorbent	L03-0.0-S	8,00	OVER-SIZE	1 419,00
Oily water and emulsion	A03-0.0-L	5,00	OVER-SIZE	954,00
Oil filter	A05-0.0-S	3,00	OVER-SIZE	480,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

08/11/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
07/11/2016
Certificat de traitement
027615

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Organic solid from water treatment	B05-0.0-S	10,00	QUATREX	5 550,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

07/11/2016
Date

Solva-Rec Environnement

Date
04/11/2016
Certificat de traitement
027614

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	8,00	QUATREX	954,00
Empty plastic container	L02-0.0-S	5,00	BARIL205	113,00
Cooking oil	D02-0.0-L	1,00	QUATREX	276,00
Used grease	A04-0.0-P	1,00	P. PACK	140,00
Used grease	A04-0.0-P	1,00	QUATREX	107.00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste
Isabelle Rajotte, Chimiste

04/11/2016
Date

Solva-Rec Environnement

Date
04/11/2016
Certificat de traitement
027613

Certificat de traitement des matières résiduelles dangereuses

Nom du client:

Baffinland Iron Mines - Mary River Proj.

Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Mercury bulb and lamp	E23-0.0-S	1,00	BARIL205	81,00
Oily water and emulsion	A03-0.0-L	1,00	BARIL205	197,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-020 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

04/11/2016
Date

Solva-Rec Environnement

Date
04/11/2016
Certificat de traitement
027612

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oil filter	A05-0.0-S	11,00	OVER-SIZE	1 761,00
Oily contaminated sorbent	L03-0.0-S	8,00	OVER-SIZE	1 281,00
Oily contaminated sorbent	L03-0.0-S	9,00	QUATREX	1 650,00
Lead battery	E15-8.0-S	1,00	QUATREX	738,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

04/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
04/11/2016
Certificat de traitement
027602

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oil filter	A05-0.0-S	4,00	OVER-SIZE	519,00
Oily water and emulsion	A03-0.0-L	1,00	OVER-SIZE	161,00
Oily contaminated sorbent	L03-0.0-S	10,00	QUATREX	1 281,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

04/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
03/11/2016
Certificat de traitement
027597

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po   *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Flammable liquid	C02-3.0-L	1,00	TOTE	398,00
Oily water and emulsion	A03-0.0-L	15,00	BARIL205	2 282,00
Oily water and emulsion	A03-0.0-L	7,00	TOTE	5 993,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

03/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
02/11/2016
Certificat de traitement
027588

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oil filter	A05-0.0-S	1,00	OVER-SIZE	182,00
Mercury bulb and lamp	E23-0.0-S	1,00	OVER-SIZE	171,00
Oily contaminated sorbent	L03-0.0-S	1,00	OVER-SIZE	151,00
Hazardous contaminated solid	M07-0.0-S	4,00	QUATREX	408,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste
Isabelle Rajotte, Chimiste

02/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
02/11/2016
Certificat de traitement
027586

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	1,00	QUATREX	67,00
Used grease	A04-0.0-P	1,00	QUATREX	71,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

02/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
02/11/2016
Certificat de traitement
027585

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Empty plastic container	L02-0.0-S	4,00	BARIL205	88,00
Oily contaminated sorbent	L03-0.0-S	11,00	QUATREX	1 370,00
Used grease	A04-0.0-P	2,00	QUATREX	202,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

02/11/2016
Date

Solva-Rec Environnement

Date
02/11/2016
Certificat de traitement
027583

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oil filter	A05-0.0-S	2,00	OVER-SIZE	297,00
Oily contaminated sorbent	L03-0.0-S	3,00	OVER-SIZE	693,00
Oily contaminated sorbent	L03-0.0-S	10,00	QUATREX	1 310,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

02/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
01/11/2016
Certificat de traitement
027577

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	4,00	OVER-SIZE	654,00
Oil filter	A05-0.0-S	3,00	OVER-SIZE	615,00
Flammable aerosol	M07-2.1-G	1,00	OVER-SIZE	126,00
Oily water and emulsion	A03-0.0-L	2,00	BARIL205	323,00
Contaminated equipment	L01-0.0-S	1,00	BARIL205	155,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

01/11/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste
Isabelle Rajotte, Chimiste

Date

Solva-Rec Environnement

Date
14/11/2016
Certificat de traitement
027739

Certificat de traitement
des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	3,00	OVER-SIZE	727,00
Oil filter	A05-0.0-S	2,00	BARIL205	274,00
Oil filter	A05-0.0-S	4,00	OVER-SIZE	685,00
Organic solid	B13-0.0-S	1,00	OVER-SIZE	238,00
Hazardous contaminated solid	M07-0.0-S	10,00	QUATREX	1 497,00
Not Regulated lab pack	K03-0.0-S	1,00	OVER-SIZE	92,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

14/11/2016
Date

Solva-Rec Environnement

Date
10/11/2016
Certificat de traitement
027643

Certificat de traitement des matières résiduelles dangereuses

Nom du client:

Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	1,00	OVER-SIZE	177,00
Oil filter	A05-0.0-S	6,00	OVER-SIZE	987,00
Ashes	E08-0.0-S	1,00	OVER-SIZE	133,00
Empty plastic container	L02-0.0-S	1,00	OVER-SIZE	308,00
Flammable aerosol	M07-2.1-G	2,00	OVER-SIZE	143,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

10/11/2016
Date

Solva Rec Environnement

Date
10/11/2016
Certificat de traitement
027645

Certificat de traitement des matières résiduelles dangereuses

Nom du client:

Baffinland Iron Mines - Mary River Proj

Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Contaminated equipment	L01-0.0-S	1,00	QUATREX	668,00
Empty plastic container	L02-0.0-S	18,00	TOTE	1 562,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste /
Isabelle Rajotte, Chimiste

10/11/2016
Date

Solva-Rec Environnement

Date
10/11/2016
Certificat de traitement
027646

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily water and emulsion	A03-0.0-L	4,00	BARIL205	684,00
Oily water and emulsion	A03-0.0-L	1,00	OVER-SIZE	358,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

10/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 (450) 347-1270 www.solva-rec.com

Solva Rec Environnement

Date
11/11/2016
Certificat de traitement
027695

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Lead battery	E15-8.0-S	6,00	QUATREX	4 057,00
Oily water and emulsion	A03-0.0-L	5,00	BARIL205	301,00
Oil filter	A05-0.0-S	2,00	OVER-SIZE	348,00
Ashes	E08-0.0-S	1,00	QUATREX	278,00
Lead battery	E15-8.0-S	1,00	OVER-SIZE	313,00
Flammable aerosol	M07-2.1-G	2,00	QUATREX	233,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

11/11/2016
Date

Solva-Rec Environnement

Date
11/11/2016
Certificat de traitement
027696

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Glycol and water (-30%)	D01-0.0-L	2,00	OVER-SIZE	467,00
Oily water and emulsion	A03-0.0-L	5,00	OVER-SIZE	1 156,00
Flammable liquid	C02-3.0-L	1,00	QUATREX	306,00
Flammable aerosol	M07-2.1-G	9,00	QUATREX	1 079,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE
Sébastien Leclerc
2012-220
QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

11/11/2016
Date

Solva-Rec Environnement

Date
10/11/2016
Certificat de traitement
027641

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	10,00	QUATREX	1 138,00
Oily contaminated sorbent	L03-0.0-S	4,00	OVER-SIZE	495,00
Oily contaminated sorbent	L03-0.0-S	1,00	BARIL205	58,00
Oily water and emulsion	A03-0.0-L	4,00	BARIL205	462,00
Oily water and emulsion	A03-0.0-L	3,00	OVER-SIZE	534,00
Oil filter	A05-0.0-S	3,00	OVER-SIZE	360,00
Used grease	A04-0.0-P	3,00	BARIL205	130,00
Flammable aerosol	M07-2.1-G	2,00	OVER-SIZE	113,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

10/11/2016
Date

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
23/11/2016
Certificat de traitement
027797

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Glycol and water (-30%)	D01-0.0-L	1,00	BARIL205	125,00
Environmental dangerous liquid lab pack	K03-9.0-L	1,00	BARIL205	128,00
Environmental dangerous liquid lab pack	K03-9.0-L	2,00	QUATREX	507,00
Oily contaminated sorbent	L03-0.0-S	4,00	QUATREX	735,00
Oily water and emulsion	A03-0.0-L	4,00	BARIL205	539,00
Oily water and emulsion	A03-0.0-L	4,00	OVER-SIZE	718,00
Cooking oil	D02-0.0-L	1,00	QUATREX	319,00
E-waste	L01-0.0-S	1,00	QUATREX	105,00
Used grease	A04-0.0-P	1,00	P. PACK	262,00
Contaminated equipment	L01-0.0-S	1,00	QUATREX	141,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

23/11/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

Solva Rec Environnement

Date
03/11/2016
Certificat de traitement
027599

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Glycol and water (-30%)	D01-0.0-L	1,00	BARIL205	196,00
Oily water and emulsion	A03-0.0-L	3,00	BARIL205	443,00
Oily water and emulsion	A03-0.0-L	7,00	OVER-SIZE	1 691,00
Ashes	E08-0.0-S	11,00	BARIL205	1 517,00
Used grease	A04-0.0-P	2,00	BARIL205	342,00
Oily contaminated sorbent	L03-0.0-S	1,00	BARIL205	195,00
Oily contaminated sorbent	L03-0.0-S	1,00	OVER-SIZE	254,00
Cooking oil	D02-0.0-L	2,00	OVER-SIZE	410,00
Oil filter	A05-0.0-S	2,00	OVER-SIZE	295,00
Oil filter	A05-0.0-S	1,00	P. PACK	231,00
Oily contaminated sorbent	L03-0.0-S	1,00	QUATREX	197,00
Cooking oil	D02-0.0-L	1,00	QUATREX	213,00
Oily water and emulsion	A03-0.0-L	1,00	TOTE	1 099,00
Empty plastic container	L02-0.0-S	1,00	TOTE	65,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-020 QUÉBEC

03/11/2016
Date

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste
Isabelle Rajotte, Chimiste

Solva-Rec Environnement

Date
18/11/2016
Certificat de traitement
027770

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	10,00	QUATREX	1 910,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste /
Isabelle Rajotte, Chimiste

18/11/2016
Date

Solva-Rec Environnement

Date
16/11/2016
Certificat de traitement
027759

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	1,00	QUATREX	70,00
Used grease	A04-0.0-P	1,00	QUATREX	95,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

16/11/2016
Date

Date
16/11/2016
Certificat de traitement
027766

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Oily contaminated sorbent	L03-0.0-S	10,00	QUATREX	1 918,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials

CHIMISTE
Sébastien Leclerc
2012-220
QUÉBEC

16/11/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

Solva-Rec Environnement

Date
15/11/2016
Certificat de traitement
027743

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Glycol and water (-30%)	D01-0.0-L	1,00	BARIL205	179,00
Oily contaminated sorbent	L03-0.0-S	3,00	QUATREX	706,00
Oily contaminated sorbent	L03-0.0-S	1,00	BARIL205	58,00
Oily water and emulsion	A03-0.0-L	4,00	BARIL205	791,00
Ashes	E08-0.0-S	1,00	BARIL205 (SL)	163,00
Flammable liquid	C02-3.0-L	1,00	QUATREX	395,00
Flammable liquid	C02-3.0-L	1,00	BARIL205	178,00
Used grease	A04-0.0-P	1,00	BARIL205	58,00
Oily water and emulsion	A03-0.0-L	3,00	OVER-SIZE	711,00
Lead battery	E15-8.0-S	1,00	QUATREX	645,00
Flammable aerosol	M07-2.1-G	5,00	QUATREX	564,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

15/11/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
15/11/2016
Certificat de traitement
027745

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Glycol and water (-30%)	D01-0.0-L	1,00	TOTE	1 271,00
Oily water and emulsion	A03-0.0-L	1,00	TOTE	998,00
Empty plastic container	L02-0.0-S	8,00	TOTE	568,00
Oily water and emulsion	A03-0.0-L	3,00	TOTE	3 753,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

15/11/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

Solva-Rec Environnement

Date
07/11/2016
Certificat de traitement
027616

Certificat de traitement des matières résiduelles dangereuses

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Lead battery	E15-8.0-S	6,00	QUATREX	4 250,00
Acide sulfurique	G02-8.0-L	1,00	QUATREX	167,00
Cooking oil	D02-0.0-L	3,00	QUATREX	833,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

07/11/2016
Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
(450) 347-3008 Fax (450) 347-1270 www.solva-rec.com

Solva-Rec Environnement

Date
21/11/2016
Certificat de traitement
027992

Certificat de traitement des matières résiduelles dangereuses

Nom du client:

Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
Contaminated equipment	L01-0.0-S	7,00	QUATREX	779,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Sébastien Leclerc 2012-220 QUÉBEC

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

21/11/2016
Date

Solva-Rec Environnement

Date
21/10/2016
Certificat de traitement
027501

Certificat de traitement des matières résiduelles dangereu

Nom du client:
Baffinland Iron Mines - Mary River Proj.
Adresse:
2775, Upper Middle Road
Oakville, ON, CANADA
L6H 0C3

Tel.: (416) 364-8820 po *Fax:*

Description du produit	Code	Qte	Format	Poids KG
aviation jet	D03-3.0-L	80,00	BARIL205	14 235,00
Diesel	D03-3.0-L	1,00	BARIL205	274,00
Contaminated water untreatable	F03-0.0-L	110,00	BARIL205	25 422,00
Organic solid	B13-0.0-S	29,00	OVER-SIZE	5 809,00
Steel empty container	L02-0.0-S	144,00	BARIL205	5 832,00
Ashes	E08-0.0-S	16,00	BARIL205	3 637,00
Ashes	E08-0.0-S	8,00	BARIL205	1 736,00

Ce document certifie que les produits mentionné au bon de connaissement de Solva-Rec Environnement Inc. ci-haut mentionné ont été reçu et que la disposition de ces produits se fera selon les normes environnementales en vigueur pour le traitement des matières résiduelles dangereuses.

This document certifies that the products mentioned in the Solva-Rec Environnement Inc. bill of lading number listed above were receiving and disposed of in accordance with environmental laws now in effect for the treatment of dangerous residual materials.

CHIMISTE Isabelle Rajotte 2015-146 QUÉBEC

21/10/2016

Éric Benoit, Chimiste / Sébastien Leclerc, Chimiste / Isabelle Rajotte, Chimiste

Date

795 rue Lucien-Beaudin, Saint Jean sur Richelieu, QC, Canada J2X 5M3
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IQALUIT OFFICE

2027 Iqaluit Lane
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info@qenv.ca

www.qenv.ca

APPENDIX D.2

2016 INCINERATOR ASH TESTING RESULTS

TABLE D.2.1
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
ANNUAL INVENTORY AND STATUS OF INCINERATOR ASH PRODUCED DURING 2016

Category	Mine Site Bins	Mine Site ~Volume m^3	Mine Site Status	Milne Port Bins	Milne Port ~Volume m^3	Milne Port Status
Landfill	10 + 6 barrels	30.50	Landfilled	2 + 91 barrels	29.22	Landfilled
Hazardous	0	0.00	-	1 barrel	0.257	Stored for offsite disposal
Total	10 + 6 barrels	30.50	N/A	2 + 92 barrels	29.47	N/A

ANNUAL EXCEEDANCES OF INCINERATOR ASH PRODUCED DURING 2016

Sample ID	Sample Date	Analyte	Minimum Detection Limit	Guideline	Result	Status
MP-ASH-191	2016-09-24	Cr	0.05 mg/L	5mg/L	22.3 mg/L	Stored for offsite disposal

Note: TCLP residual analysis tests were performed by ALS Laboratories and compared to Process Residuals Discharge Minimum (GN, 2011) to determine if ash was landfill compliant. 2016 produced incinerator ash volume: Bin = 3.62 m3 * 0.8 Barrel = 85 Gal *0.8, Volumes converted to m^3.

BAFFINLAND IRON MINES CORPORATION
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 19-JAN-16
Report Date: 26-JAN-16 13:56 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1726145
Project P.O. #: 4500007003
Job Reference: MINE SITE-ASH
C of C Numbers:
Legal Site Desc:

Austin Paterson
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1726145-1 MS-ASH-130 Sampled By: B. BOWDEN on 15-JAN-16 @ 11:00 Matrix: SOIL							
Sample Preparation							
Initial pH	11.16		0.10	pH units	22-JAN-16	22-JAN-16	R3382894
Final pH	6.31		0.10	pH units	22-JAN-16	22-JAN-16	R3382894
Physical Tests							
% Moisture	0.79		0.10	%	22-JAN-16	23-JAN-16	R3382407
TCLP Metals							
Arsenic (As)	0.120		0.050	mg/L		25-JAN-16	R3383655
Barium (Ba)	<0.50		0.50	mg/L		25-JAN-16	R3383655
Boron (B)	5.0		2.5	mg/L		25-JAN-16	R3383655
Cadmium (Cd)	<0.0050		0.0050	mg/L		25-JAN-16	R3383655
Chromium (Cr)	<0.050		0.050	mg/L		25-JAN-16	R3383655
Lead (Pb)	<0.050		0.050	mg/L		25-JAN-16	R3383655
Mercury (Hg)	<0.00010		0.00010	mg/L		25-JAN-16	R3383696
Selenium (Se)	<0.25		0.25	mg/L		25-JAN-16	R3383655
Silver (Ag)	<0.0050		0.0050	mg/L		25-JAN-16	R3383655
Uranium (U)	<0.25		0.25	mg/L		25-JAN-16	R3383655
Zinc (Zn)-Total	1.4		1.0	mg/L		25-JAN-16	R3383655

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311
Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).			
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: BAFFINLAND IRON MINES CORPORATION
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3382407								
WG2249258-3 DUP		**L1726133-16**						
% Moisture		5.04	5.18		%	2.6	20	23-JAN-16
WG2249258-2 LCS								
% Moisture			97.0		%		90-110	23-JAN-16
WG2249258-1 MB								
% Moisture			<0.10		%		0.1	23-JAN-16
HG-TCLP-WT	**Waste**							
Batch R3383696								
WG2250237-3 DUP		**L1724882-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	25-JAN-16
WG2250237-2 LCS								
Mercury (Hg)			96.0		%		70-130	25-JAN-16
WG2250237-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	25-JAN-16
WG2250237-4 MS		**L1724882-1**						
Mercury (Hg)			86.3		%		50-140	25-JAN-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3383655								
WG2250178-4 DUP		**WG2250178-3**						
Zinc (Zn)-Total		1.4	1.3		mg/L	5.6	30	25-JAN-16
WG2250178-2 LCS								
Zinc (Zn)-Total			94.5		%		70-130	25-JAN-16
WG2250178-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	25-JAN-16
WG2250178-5 MS		**WG2250178-3**						
Zinc (Zn)-Total			103.4		%		70-130	25-JAN-16
MET-TCLP-WT	**Waste**							
Batch R3383655								
WG2250178-4 DUP		**WG2250178-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	25-JAN-16
Arsenic (As)		0.120	0.113		mg/L	6.3	40	25-JAN-16
Boron (B)		5.0	4.9		mg/L	3.1	40	25-JAN-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	25-JAN-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	25-JAN-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	25-JAN-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	25-JAN-16

Quality Control Report

Workorder: L1726145 Report Date: 26-JAN-16

Client: BAFFINLAND IRON MINES CORPORATION
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3383655								
WG2250178-4 DUP		**WG2250178-3**						
Selenium (Se)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	25-JAN-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	25-JAN-16
WG2250178-2 LCS								
Silver (Ag)			96.3		%		70-130	25-JAN-16
Arsenic (As)			96.3		%		70-130	25-JAN-16
Boron (B)			94.5		%		70-130	25-JAN-16
Barium (Ba)			97.2		%		70-130	25-JAN-16
Cadmium (Cd)			97.5		%		70-130	25-JAN-16
Chromium (Cr)			100.7		%		70-130	25-JAN-16
Lead (Pb)			98.4		%		70-130	25-JAN-16
Selenium (Se)			97.8		%		70-130	25-JAN-16
Uranium (U)			99.8		%		70-130	25-JAN-16
WG2250178-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	25-JAN-16
Arsenic (As)			<0.050		mg/L		0.05	25-JAN-16
Boron (B)			<2.5		mg/L		2.5	25-JAN-16
Barium (Ba)			<0.50		mg/L		0.5	25-JAN-16
Cadmium (Cd)			<0.0050		mg/L		0.005	25-JAN-16
Chromium (Cr)			<0.050		mg/L		0.05	25-JAN-16
Lead (Pb)			<0.050		mg/L		0.05	25-JAN-16
Selenium (Se)			<0.25		mg/L		0.25	25-JAN-16
Uranium (U)			<0.25		mg/L		0.25	25-JAN-16
WG2250178-5 MS		**WG2250178-3**						
Silver (Ag)			125.9		%		50-150	25-JAN-16
Arsenic (As)			105.3		%		50-150	25-JAN-16
Boron (B)			102.6		%		50-150	25-JAN-16
Barium (Ba)			112.4		%		50-150	25-JAN-16
Cadmium (Cd)			110.5		%		50-150	25-JAN-16
Chromium (Cr)			105.5		%		50-150	25-JAN-16
Lead (Pb)			103.7		%		50-150	25-JAN-16
Selenium (Se)			110.4		%		50-150	25-JAN-16
Uranium (U)			105.4		%		50-150	25-JAN-16

Quality Control Report

Workorder: L1726145 Report Date: 26-JAN-16

Client: BAFFINLAND IRON MINES CORPORATION
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1726145-COFC

COC Number: 14 -

Page 1 of 1

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax bimcore@alsglobal.com

Email 2 bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To

Same as Report To ☑ Yes ☐ No

Copy of Invoice with Report ☐ Yes ☑ No

Company:

Contact:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com

Email 2

Project Information

ALS Quote #:	Q42455
Job #:	MINE SITE - ASH
PO / AFE:	4500005452
LSD:	

Oil and Gas Required Fields (client use)

Approver ID: | Cost Center:

GL Account: | Routing Code:

Activity Code:

Location:

ALS Lab Work Order # (lab use only) L1726145

ALS Contact: Wayne Smith | Sampler: Bill Bowden

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report) 22A.	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn)-	Number of Containers
1	MS-ASH-130	15-Jan-16	11:00	Soil	R	2

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 18°C

FINAL COOLER TEMPERATURES °C: 6.7

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Bill Bowden	Date: 20-JAN-16	Time: 08:15	Received by: [signature]	Date: 1/19/16	Time: 6:30	Received by: [signature] Jan	Date: 22/16	Time: 945

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

BAFFINLAND IRON MINES CORPORATION
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 04-MAR-16
Report Date: 10-MAR-16 13:15 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1741841

Project P.O. #: 4500007003

Job Reference: MINE SITE-ASH

C of C Numbers:

Legal Site Desc:

Austin Paterson
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1741841-1 MS-ASH-131 Sampled By: CD/EA on 03-MAR-16 @ 17:45 Matrix: SOIL							
Sample Preparation							
Initial pH	11.00		0.10	pH units	08-MAR-16	08-MAR-16	R3416337
Final pH	5.76		0.10	pH units	08-MAR-16	08-MAR-16	R3416337
Physical Tests							
% Moisture	<0.10		0.10	%	08-MAR-16	09-MAR-16	R3416100
TCLP Metals							
Arsenic (As)	0.054		0.050	mg/L		10-MAR-16	R3416937
Barium (Ba)	<0.50		0.50	mg/L		10-MAR-16	R3416937
Boron (B)	3.6		2.5	mg/L		10-MAR-16	R3416937
Cadmium (Cd)	<0.0050		0.0050	mg/L		10-MAR-16	R3416937
Chromium (Cr)	<0.050		0.050	mg/L		10-MAR-16	R3416937
Lead (Pb)	<0.050		0.050	mg/L		10-MAR-16	R3416937
Mercury (Hg)	<0.00010		0.00010	mg/L		10-MAR-16	R3416836
Selenium (Se)	<0.25		0.25	mg/L		10-MAR-16	R3416937
Silver (Ag)	<0.0050		0.0050	mg/L		10-MAR-16	R3416937
Uranium (U)	<0.25		0.25	mg/L		10-MAR-16	R3416937
Zinc (Zn)-Total	34.3		1.0	mg/L		10-MAR-16	R3416937

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Zinc (Zn)-Total	MS-B	L1741841-1

Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: BAFFINLAND IRON MINES CORPORATION
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3416100								
WG2271968-3 DUP		**L1741604-2**						
% Moisture		27.0	26.7		%	1.0	20	09-MAR-16
WG2271968-2 LCS								
% Moisture			95.7		%		90-110	09-MAR-16
WG2271968-1 MB								
% Moisture			<0.10		%		0.1	09-MAR-16
HG-TCLP-WT	**Waste**							
Batch R3416836								
WG2273223-3 DUP		**L1741841-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	10-MAR-16
WG2273223-2 LCS								
Mercury (Hg)			106.0		%		70-130	10-MAR-16
WG2273223-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	10-MAR-16
WG2273223-4 MS		**L1741841-1**						
Mercury (Hg)			95.7		%		50-140	10-MAR-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3416937								
WG2273101-4 DUP		**WG2273101-3**						
Zinc (Zn)-Total		34.3	34.2		mg/L	0.5	30	10-MAR-16
WG2273101-2 LCS								
Zinc (Zn)-Total			91.1		%		70-130	10-MAR-16
WG2273101-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	10-MAR-16
WG2273101-5 MS		**WG2273101-3**						
Zinc (Zn)-Total			N/A	MS-B	%		-	10-MAR-16
MET-TCLP-WT	**Waste**							
Batch R3416937								
WG2273101-4 DUP		**WG2273101-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	10-MAR-16
Arsenic (As)		0.054	0.052		mg/L	3.9	40	10-MAR-16
Boron (B)		3.6	3.6		mg/L	0.2	40	10-MAR-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	10-MAR-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	10-MAR-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	10-MAR-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	10-MAR-16

Quality Control Report

Client: BAFFINLAND IRON MINES CORPORATION
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3416937								
WG2273101-4 DUP		**WG2273101-3**						
Selenium (Se)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	10-MAR-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	10-MAR-16
WG2273101-2 LCS								
Silver (Ag)			98.2		%		70-130	10-MAR-16
Arsenic (As)			95.8		%		70-130	10-MAR-16
Boron (B)			87.9		%		70-130	10-MAR-16
Barium (Ba)			94.1		%		70-130	10-MAR-16
Cadmium (Cd)			95.1		%		70-130	10-MAR-16
Chromium (Cr)			96.3		%		70-130	10-MAR-16
Lead (Pb)			95.0		%		70-130	10-MAR-16
Selenium (Se)			94.7		%		70-130	10-MAR-16
Uranium (U)			96.5		%		70-130	10-MAR-16
WG2273101-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	10-MAR-16
Arsenic (As)			<0.050		mg/L		0.05	10-MAR-16
Boron (B)			<2.5		mg/L		2.5	10-MAR-16
Barium (Ba)			<0.50		mg/L		0.5	10-MAR-16
Cadmium (Cd)			<0.0050		mg/L		0.005	10-MAR-16
Chromium (Cr)			<0.050		mg/L		0.05	10-MAR-16
Lead (Pb)			<0.050		mg/L		0.05	10-MAR-16
Selenium (Se)			<0.25		mg/L		0.25	10-MAR-16
Uranium (U)			<0.25		mg/L		0.25	10-MAR-16
WG2273101-5 MS		**WG2273101-3**						
Silver (Ag)			118.8		%		50-150	10-MAR-16
Arsenic (As)			101.6		%		50-150	10-MAR-16
Boron (B)			96.0		%		50-150	10-MAR-16
Barium (Ba)			103.2		%		50-150	10-MAR-16
Cadmium (Cd)			103.8		%		50-150	10-MAR-16
Chromium (Cr)			99.7		%		50-150	10-MAR-16
Lead (Pb)			98.0		%		50-150	10-MAR-16
Selenium (Se)			101.4		%		50-150	10-MAR-16
Uranium (U)			105.3		%		50-150	10-MAR-16

Quality Control Report

Workorder: L1741841 Report Date: 10-MAR-16

Client: BAFFINLAND IRON MINES CORPORATION
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax bimcore@alsglobal.com

Email 2 bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To

Same as Report To ☑ Yes ☐ No

Copy of Invoice with Report ☐ Yes ☑ No

Company:

Contact:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com

Email 2

Project Information

ALS Quote #:	Q42455
Job #:	MINE SITE - ASH
PO / AFE:	4500005452
LSD:	

Oil and Gas Required Fields (client use)

Approver ID: Cost Center:

GL Account: Routing Code:

Activity Code:

Location:

ALS Lab Work Order # (lab use only) L1741841

ALS Contact: Wayne Smith

Sampler: CD EA

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report) 08A	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn)-	Number of Containers
1	MS-ASH-131	3-Mar-16	17:45	Soil	R	2

L1741841-COFC

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☑ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 20

FINAL COOLER TEMPERATURES °C: 14.7

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Connor Devereaux	Date: 04-MAR-16	Time: 08:00	Received by: F. Klein	Date: Mar 4/16	Time: 8:00	Received by: SH	Date: 08-MAR-16	Time: 9:10

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Baffinland Iron Mine's Corporation
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 05-APR-16
Report Date: 12-APR-16 06:58 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1753093

Project P.O. #: 4500017476
Job Reference: MINE SITE-ASH
C of C Numbers:
Legal Site Desc:

Austin Paterson
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1753093-1 MS-ASH-132 Sampled By: BB on 03-APR-16 @ 17:00 Matrix: SOIL							
Sample Preparation							
Initial pH	11.66		0.10	pH units	07-APR-16	07-APR-16	R3435117
Final pH	6.99		0.10	pH units	07-APR-16	07-APR-16	R3435117
Physical Tests							
% Moisture	0.34		0.10	%	07-APR-16	08-APR-16	R3434205
TCLP Metals							
Arsenic (As)	0.057		0.050	mg/L		11-APR-16	R3435834
Barium (Ba)	<0.50		0.50	mg/L		11-APR-16	R3435834
Boron (B)	4.6		2.5	mg/L		11-APR-16	R3435834
Cadmium (Cd)	0.0330		0.0050	mg/L		11-APR-16	R3435834
Chromium (Cr)	<0.050		0.050	mg/L		11-APR-16	R3435834
Lead (Pb)	<0.050		0.050	mg/L		11-APR-16	R3435834
Mercury (Hg)	<0.00010		0.00010	mg/L		11-APR-16	R3435994
Selenium (Se)	<0.25		0.25	mg/L		11-APR-16	R3435834
Silver (Ag)	<0.0050		0.0050	mg/L		11-APR-16	R3435834
Uranium (U)	<0.25		0.25	mg/L		11-APR-16	R3435834
Zinc (Zn)-Total	<1.0		1.0	mg/L		11-APR-16	R3435834

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311
Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).			
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3434205								
WG2287383-3 DUP		**L1752075-1**						
% Moisture		15.5	15.4		%	0.2	20	08-APR-16
WG2287383-2 LCS								
% Moisture			97.3		%		90-110	08-APR-16
WG2287383-1 MB								
% Moisture			<0.10		%		0.1	08-APR-16
HG-TCLP-WT	**Waste**							
Batch R3435994								
WG2288989-3 DUP		**L1753093-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	11-APR-16
WG2288989-2 LCS								
Mercury (Hg)			96.2		%		70-130	11-APR-16
WG2288989-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	11-APR-16
WG2288989-4 MS		**L1753093-1**						
Mercury (Hg)			90.7		%		50-140	11-APR-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3435834								
WG2288880-4 DUP		**WG2288880-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	11-APR-16
WG2288880-2 LCS								
Zinc (Zn)-Total			90.4		%		70-130	11-APR-16
WG2288880-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	11-APR-16
WG2288880-5 MS		**WG2288880-3**						
Zinc (Zn)-Total			101.1		%		70-130	11-APR-16
MET-TCLP-WT	**Waste**							
Batch R3435834								
WG2288880-4 DUP		**WG2288880-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	11-APR-16
Arsenic (As)		0.057	0.053		mg/L	6.2	40	11-APR-16
Boron (B)		4.6	4.4		mg/L	3.4	40	11-APR-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	11-APR-16
Cadmium (Cd)		0.0330	0.0311		mg/L	6.0	40	11-APR-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	11-APR-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	11-APR-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3435834								
WG2288880-4 DUP		**WG2288880-3**						
Selenium (Se)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	11-APR-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	11-APR-16
WG2288880-2 LCS								
Silver (Ag)			97.0		%		70-130	11-APR-16
Arsenic (As)			95.4		%		70-130	11-APR-16
Boron (B)			90.9		%		70-130	11-APR-16
Barium (Ba)			98.8		%		70-130	11-APR-16
Cadmium (Cd)			96.1		%		70-130	11-APR-16
Chromium (Cr)			91.9		%		70-130	11-APR-16
Lead (Pb)			96.0		%		70-130	11-APR-16
Selenium (Se)			95.1		%		70-130	11-APR-16
Uranium (U)			91.9		%		70-130	11-APR-16
WG2288880-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	11-APR-16
Arsenic (As)			<0.050		mg/L		0.05	11-APR-16
Boron (B)			<2.5		mg/L		2.5	11-APR-16
Barium (Ba)			<0.50		mg/L		0.5	11-APR-16
Cadmium (Cd)			<0.0050		mg/L		0.005	11-APR-16
Chromium (Cr)			<0.050		mg/L		0.05	11-APR-16
Lead (Pb)			<0.050		mg/L		0.05	11-APR-16
Selenium (Se)			<0.25		mg/L		0.25	11-APR-16
Uranium (U)			<0.25		mg/L		0.25	11-APR-16
WG2288880-5 MS		**WG2288880-3**						
Silver (Ag)			133.8		%		50-150	11-APR-16
Arsenic (As)			102.9		%		50-150	11-APR-16
Boron (B)			92.0		%		50-150	11-APR-16
Barium (Ba)			102.1		%		50-150	11-APR-16
Cadmium (Cd)			101.9		%		50-150	11-APR-16
Chromium (Cr)			98.8		%		50-150	11-APR-16
Lead (Pb)			99.0		%		50-150	11-APR-16
Selenium (Se)			103.3		%		50-150	11-APR-16
Uranium (U)			106.8		%		50-150	11-APR-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1753093-COFC

COC Number: 14 -

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Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ Yes ☐ No
☑ Criteria on Report - provide details below if box checked
Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: bimcore@alsglobal.com
Email 2: bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To		
Same as Report To	☑ Yes	☐ No
Copy of Invoice with Report	☐ Yes	☑ No
Company:		
Contact:		

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: ap@baffinland.com
Email 2:

Project Information

ALS Quote #:	Q42455
Job #:	MINE SITE - ASH
PO / AFE:	4500017476
LSD:	

Oil and Gas Required Fields (client use)

Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only): APR07B L1753093 ay

ALS Contact: Wayne Smith Sampler: BB

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn)	Number of Containers
1	MS-ASH-132	3-Apr-16	17:00	Soil	R	2

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No
Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☑
Ice packs Yes ☐ No ☑ Custody seal intact Yes ☐ No ☑
Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
18	11.6

SHIPMENT RELEASE (client use)		
Released by: Bill Bowden	Date: 05-APR-16	Time: 08:00

INITIAL SHIPMENT RECEPTION (lab use only)		
Received by: F. Khalil	Date: 7-Apr-16	Time: 9:20

FINAL SHIPMENT RECEPTION (lab use only)		
Received by: SH	Date: 7-APR-16	Time: 11:00

Baffinland Iron Mine’s Corporation
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 12-MAY-16
Report Date: 17-MAY-16 10:34 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1766942
Project P.O. #: 4500017476
Job Reference: MINE SITE - ASH
C of C Numbers:
Legal Site Desc:

Austin Paterson
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L17669421-1 MS-ASH-133 Sampled By: BB/KB on 03-APR-16 @ 17:00 Matrix: SOIL							
Sample Preparation							
Initial pH	11.65		0.10	pH units	12-MAY-16	12-MAY-16	R3457727
Final pH	7.52		0.10	pH units	12-MAY-16	12-MAY-16	R3457727
Physical Tests							
% Moisture	0.44		0.10	%	12-MAY-16	13-MAY-16	R3456707
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		16-MAY-16	R3458823
Barium (Ba)	<0.50		0.50	mg/L		16-MAY-16	R3458823
Boron (B)	4.3		2.5	mg/L		16-MAY-16	R3458823
Cadmium (Cd)	<0.0050		0.0050	mg/L		16-MAY-16	R3458823
Chromium (Cr)	<0.050		0.050	mg/L		16-MAY-16	R3458823
Lead (Pb)	<0.050		0.050	mg/L		16-MAY-16	R3458823
Mercury (Hg)	<0.00010		0.00010	mg/L		16-MAY-16	R3459218
Selenium (Se)	<0.25		0.25	mg/L		16-MAY-16	R3458823
Silver (Ag)	<0.0050		0.0050	mg/L		16-MAY-16	R3458823
Uranium (U)	<0.25		0.25	mg/L		16-MAY-16	R3458823
Zinc (Zn)-Total	<1.0		1.0	mg/L		16-MAY-16	R3458823

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311
Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).			
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3456707								
WG2306868-3 DUP		**L1767219-2**						
% Moisture		11.0	10.8		%	1.8	20	13-MAY-16
WG2306868-2 LCS								
% Moisture			100.0		%		90-110	13-MAY-16
WG2306868-1 MB								
% Moisture			<0.10		%		0.1	13-MAY-16
HG-TCLP-WT	**Waste**							
Batch R3459218								
WG2308920-3 DUP		**L1766912-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	16-MAY-16
WG2308920-2 LCS								
Mercury (Hg)			105.0		%		70-130	16-MAY-16
WG2308920-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	16-MAY-16
WG2308920-4 MS		**L1768586-1**						
Mercury (Hg)			94.3		%		50-140	16-MAY-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3458823								
WG2308790-4 DUP		**WG2308790-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	16-MAY-16
WG2308790-2 LCS								
Zinc (Zn)-Total			92.7		%		70-130	16-MAY-16
WG2308790-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	16-MAY-16
WG2308790-5 MS		**WG2308790-3**						
Zinc (Zn)-Total			106.5		%		70-130	16-MAY-16
MET-TCLP-WT	**Waste**							
Batch R3458823								
WG2308790-4 DUP		**WG2308790-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	16-MAY-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	16-MAY-16
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	16-MAY-16
Barium (Ba)		0.80	0.78		mg/L	3.4	40	16-MAY-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	16-MAY-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	16-MAY-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	16-MAY-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3458823								
WG2308790-4 DUP		**WG2308790-3**						
Selenium (Se)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	16-MAY-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	16-MAY-16
WG2308790-2 LCS								
Silver (Ag)			98.9		%		70-130	16-MAY-16
Arsenic (As)			99.7		%		70-130	16-MAY-16
Boron (B)			93.4		%		70-130	16-MAY-16
Barium (Ba)			102.4		%		70-130	16-MAY-16
Cadmium (Cd)			100.2		%		70-130	16-MAY-16
Chromium (Cr)			98.4		%		70-130	16-MAY-16
Lead (Pb)			101.9		%		70-130	16-MAY-16
Selenium (Se)			98.8		%		70-130	16-MAY-16
Uranium (U)			99.1		%		70-130	16-MAY-16
WG2308790-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	16-MAY-16
Arsenic (As)			<0.050		mg/L		0.05	16-MAY-16
Boron (B)			<2.5		mg/L		2.5	16-MAY-16
Barium (Ba)			<0.50		mg/L		0.5	16-MAY-16
Cadmium (Cd)			<0.0050		mg/L		0.005	16-MAY-16
Chromium (Cr)			<0.050		mg/L		0.05	16-MAY-16
Lead (Pb)			<0.050		mg/L		0.05	16-MAY-16
Selenium (Se)			<0.25		mg/L		0.25	16-MAY-16
Uranium (U)			<0.25		mg/L		0.25	16-MAY-16
WG2308790-5 MS		**WG2308790-3**						
Silver (Ag)			138.2		%		50-150	16-MAY-16
Arsenic (As)			111.0		%		50-150	16-MAY-16
Boron (B)			108.2		%		50-150	16-MAY-16
Barium (Ba)			113.6		%		50-150	16-MAY-16
Cadmium (Cd)			114.6		%		50-150	16-MAY-16
Chromium (Cr)			110.8		%		50-150	16-MAY-16
Lead (Pb)			110.7		%		50-150	16-MAY-16
Selenium (Se)			113.4		%		50-150	16-MAY-16
Uranium (U)			114.4		%		50-150	16-MAY-16

Quality Control Report

Workorder: L1766942 Report Date: 17-MAY-16

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1766942 Report Date: 17-MAY-16

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
% Moisture							
	1	03-APR-16 17:00	13-MAY-16 14:49	14	40	days	EHTR
TCLP Metals							
Mercury (CVAA) for O.Reg 347							
	1	03-APR-16 17:00	16-MAY-16 00:00	28	42	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1766942 were received on 12-MAY-16 10:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1766942-COFC

COC Number: 14 -

Page 1 of 1

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ Yes ☐ No
☑ Criteria on Report - provide details below if box checked	
Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	bimcore@alsglobal.com
Email 2	bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)	
R	☑ Regular (Standard TAT if received by 3 pm - business days)
P	☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
E	☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
E2	☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Specify Date Required for E2,E or P:	

Invoice To	
Same as Report To	☑ Yes ☐ No
Copy of Invoice with Report	☐ Yes ☑ No
Company:	
Contact:	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	

Project Information	
ALS Quote #:	Q42455
Job #:	MINE SITE - ASH
PO / AFE:	4500017476
LSD:	
ALS Lab Work Order # (lab use only)	L1766942

Oil and Gas Required Fields (client use)	
Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	
ALS Contact: Wayne Smith	Sampler: BB/KB

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn)	Number of Containers
1	MS-ASH-133	3-Apr-16	17:00	Soil	R	2

Drinking Water (DW) Samples[1] (client use)	
Are samples taken from a Regulated DW System?	☐ Yes ☑ No
Are samples for human drinking water use?	☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐		SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☑ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated ☐			
INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	14.9

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katherine Babin Bill Bowden	Date: 16-05-05	Time: 16:00	Received by: [signature]	Date: 05/05/16	Time: 6:00pm	Received by: [signature]	Date: May 12/16	Time: 9:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Baffinland Iron Mine's Corporation
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 16-JUN-16
Report Date: 24-JUN-16 13:34 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1786191

Project P.O. #: 4500017476

Job Reference: MINE SITE -ASH

C of C Numbers:

Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1786191-1 MS-ASH-134 Sampled By: AV/CD/BG on 15-JUN-16 @ 17:40 Matrix: SOIL							
Sample Preparation							
Initial pH	11.62		0.10	pH units	21-JUN-16	21-JUN-16	R3486776
Final pH	6.12		0.10	pH units	21-JUN-16	21-JUN-16	R3486776
Physical Tests							
% Moisture	0.49		0.10	%	21-JUN-16	22-JUN-16	R3486487
TCLP Metals							
Arsenic (As)	0.069		0.050	mg/L		23-JUN-16	R3488385
Barium (Ba)	<0.50		0.50	mg/L		23-JUN-16	R3488385
Boron (B)	3.4		2.5	mg/L		23-JUN-16	R3488385
Cadmium (Cd)	<0.0050		0.0050	mg/L		23-JUN-16	R3488385
Chromium (Cr)	<0.050		0.050	mg/L		23-JUN-16	R3488385
Lead (Pb)	<0.050		0.050	mg/L		23-JUN-16	R3488385
Mercury (Hg)	<0.00010		0.00010	mg/L		22-JUN-16	R3486799
Selenium (Se)	<0.025		0.025	mg/L		23-JUN-16	R3488385
Silver (Ag)	<0.0050		0.0050	mg/L		23-JUN-16	R3488385
Uranium (U)	<0.25		0.25	mg/L		23-JUN-16	R3488385
Zinc (Zn)-Total	<1.0		1.0	mg/L		23-JUN-16	R3488385

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1786191 Report Date: 24-JUN-16

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3486487								
WG2331967-3 DUP		**L1785882-21**						
% Moisture		8.84	8.89		%	0.6	20	22-JUN-16
WG2331967-2 LCS								
% Moisture			99.5		%		90-110	22-JUN-16
WG2331967-1 MB								
% Moisture			<0.10		%		0.1	22-JUN-16
HG-TCLP-WT	**Waste**							
Batch R3486799								
WG2332859-3 DUP		**L1786028-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	22-JUN-16
WG2332859-2 LCS								
Mercury (Hg)			103.0		%		70-130	22-JUN-16
WG2332859-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	22-JUN-16
WG2332859-4 MS		**L1785449-1**						
Mercury (Hg)			94.7		%		50-140	22-JUN-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3488385								
WG2333157-4 DUP		**WG2333157-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	23-JUN-16
WG2333157-2 LCS								
Zinc (Zn)-Total			83.3		%		70-130	23-JUN-16
WG2333157-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	23-JUN-16
WG2333157-5 MS		**WG2333157-3**						
Zinc (Zn)-Total			79.4		%		70-130	23-JUN-16
MET-TCLP-WT	**Waste**							
Batch R3488385								
WG2333157-4 DUP		**WG2333157-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	23-JUN-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	23-JUN-16
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	23-JUN-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	23-JUN-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	23-JUN-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	23-JUN-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	23-JUN-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3488385								
WG2333157-4 DUP		**WG2333157-3**						
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	23-JUN-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	23-JUN-16
WG2333157-2 LCS								
Silver (Ag)			90.5		%		70-130	23-JUN-16
Arsenic (As)			89.6		%		70-130	23-JUN-16
Boron (B)			92.4		%		70-130	23-JUN-16
Barium (Ba)			93.8		%		70-130	23-JUN-16
Cadmium (Cd)			89.2		%		70-130	23-JUN-16
Chromium (Cr)			89.1		%		70-130	23-JUN-16
Lead (Pb)			91.0		%		70-130	23-JUN-16
Selenium (Se)			87.6		%		70-130	23-JUN-16
Uranium (U)			92.4		%		70-130	23-JUN-16
WG2333157-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	23-JUN-16
Arsenic (As)			<0.050		mg/L		0.05	23-JUN-16
Boron (B)			<2.5		mg/L		2.5	23-JUN-16
Barium (Ba)			<0.50		mg/L		0.5	23-JUN-16
Cadmium (Cd)			<0.0050		mg/L		0.005	23-JUN-16
Chromium (Cr)			<0.050		mg/L		0.05	23-JUN-16
Lead (Pb)			<0.050		mg/L		0.05	23-JUN-16
Selenium (Se)			<0.025		mg/L		0.025	23-JUN-16
Uranium (U)			<0.25		mg/L		0.25	23-JUN-16
WG2333157-5 MS		**WG2333157-3**						
Silver (Ag)			96.8		%		50-150	23-JUN-16
Arsenic (As)			83.4		%		50-150	23-JUN-16
Boron (B)			82.3		%		50-150	23-JUN-16
Barium (Ba)			89.6		%		50-150	23-JUN-16
Cadmium (Cd)			85.9		%		50-150	23-JUN-16
Chromium (Cr)			82.0		%		50-150	23-JUN-16
Lead (Pb)			80.4		%		50-150	23-JUN-16
Selenium (Se)			81.7		%		50-150	23-JUN-16
Uranium (U)			81.8		%		50-150	23-JUN-16

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1786191-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Contact:	Jim Millard	Quality Control (QC) Report with Report	☑ Yes ☐ No
Address:	2275 Upper Middle Rd. E., Suite #300	☑ Criteria on Report - provide details below if box checked	
	Oakville, ON, L6H 0C3	Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Phone:	647-253-0596 EXT 6010	Email 1 or Fax	bimcore@alsglobal.com
		Email 2	bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To			Invoice Distribution	
	Same as Report To	☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report	☐ Yes ☑ No	Email 1 or Fax	ap@baffinland.com
Company:			Email 2	
Contact:				

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MINE SITE - ASH	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L1786191 (initials) 21B

ALS Contact: Wayne Smith | Sampler: AV/CD/BG

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn) -	Number of Containers
1	MS-ASH-134	15-Jun-16	17:40	Soil	R	2

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☑ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 26
FINAL COOLER TEMPERATURES °C: 22

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Andrew Vermeer	Date: 16-06-16	Time: 9:00	Received by: F. Khalili	Date: 16-Jun-16	Time: 8:00	Received by: (signature)	Date: 21-Jun-16	Time: e930

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION   WHITE - LABORATORY COPY   YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

Baffinland Iron Mine's Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 07-JUL-16
Report Date: 13-JUL-16 13:06 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1793580

Project P.O. #: 4500017476
Job Reference: MINE SITE - ASH
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1793580-1 MS-COMP-6 Sampled By: KM/NF on 04-JUL-16 @ 23:11 Matrix: SOIL							
Sample Preparation							
Initial pH	11.99		0.10	pH units	07-JUL-16	07-JUL-16	R3498475
Final pH	7.51		0.10	pH units	07-JUL-16	07-JUL-16	R3498475
Physical Tests							
% Moisture	0.93		0.10	%	07-JUL-16	08-JUL-16	R3498335
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Barium (Ba)	<0.50		0.50	mg/L		11-JUL-16	R3500260
Boron (B)	3.8		2.5	mg/L		11-JUL-16	R3500260
Cadmium (Cd)	<0.0050		0.0050	mg/L		11-JUL-16	R3500260
Chromium (Cr)	0.698		0.050	mg/L		11-JUL-16	R3500260
Lead (Pb)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Mercury (Hg)	<0.00010		0.00010	mg/L		11-JUL-16	R3500959
Selenium (Se)	<0.025		0.025	mg/L		11-JUL-16	R3500260
Silver (Ag)	<0.0050		0.0050	mg/L		11-JUL-16	R3500260
Uranium (U)	<0.25		0.25	mg/L		11-JUL-16	R3500260
Zinc (Zn)-Total	<1.0		1.0	mg/L		11-JUL-16	R3500260
L1793580-2 MS-COMP-7 Sampled By: KM/NF on 04-JUL-16 @ 23:11 Matrix: SOIL							
Sample Preparation							
Initial pH	12.40		0.10	pH units	07-JUL-16	07-JUL-16	R3498475
Final pH	10.43		0.10	pH units	07-JUL-16	07-JUL-16	R3498475
Physical Tests							
% Moisture	0.26		0.10	%	07-JUL-16	08-JUL-16	R3498335
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Barium (Ba)	0.65		0.50	mg/L		11-JUL-16	R3500260
Boron (B)	4.3		2.5	mg/L		11-JUL-16	R3500260
Cadmium (Cd)	<0.0050		0.0050	mg/L		11-JUL-16	R3500260
Chromium (Cr)	0.830		0.050	mg/L		11-JUL-16	R3500260
Lead (Pb)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Mercury (Hg)	<0.00010		0.00010	mg/L		11-JUL-16	R3500959
Selenium (Se)	<0.025		0.025	mg/L		11-JUL-16	R3500260
Silver (Ag)	<0.0050		0.0050	mg/L		11-JUL-16	R3500260
Uranium (U)	<0.25		0.25	mg/L		11-JUL-16	R3500260
Zinc (Zn)-Total	<1.0		1.0	mg/L		11-JUL-16	R3500260
L1793580-3 MS-ASH-141 Sampled By: KM/NF on 04-JUL-16 @ 23:17 Matrix: SOIL							
Sample Preparation							
Initial pH	11.70		0.10	pH units	07-JUL-16	07-JUL-16	R3498475
Final pH	11.40		0.10	pH units	07-JUL-16	07-JUL-16	R3498475
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1793580-3 MS-ASH-141 Sampled By: KM/NF on 04-JUL-16 @ 23:17 Matrix: SOIL							
Physical Tests							
% Moisture	<0.10		0.10	%	07-JUL-16	08-JUL-16	R3498335
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Barium (Ba)	<0.50		0.50	mg/L		11-JUL-16	R3500260
Boron (B)	<2.5		2.5	mg/L		11-JUL-16	R3500260
Cadmium (Cd)	<0.0050		0.0050	mg/L		11-JUL-16	R3500260
Chromium (Cr)	0.164		0.050	mg/L		11-JUL-16	R3500260
Lead (Pb)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Mercury (Hg)	<0.00010		0.00010	mg/L		11-JUL-16	R3500959
Selenium (Se)	<0.025		0.025	mg/L		11-JUL-16	R3500260
Silver (Ag)	<0.0050		0.0050	mg/L		11-JUL-16	R3500260
Uranium (U)	<0.25		0.25	mg/L		11-JUL-16	R3500260
Zinc (Zn)-Total	<1.0		1.0	mg/L		11-JUL-16	R3500260
L1793580-4 MS-HA-193 Sampled By: KM/NF on 04-JUL-16 @ 23:11 Matrix: SOIL							
Sample Preparation							
Initial pH	9.63		0.10	pH units	07-JUL-16	07-JUL-16	R3498475
Final pH	4.93		0.10	pH units	07-JUL-16	07-JUL-16	R3498475
Physical Tests							
% Moisture	46.7		0.10	%	07-JUL-16	08-JUL-16	R3498335
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Barium (Ba)	<0.50		0.50	mg/L		11-JUL-16	R3500260
Boron (B)	<2.5		2.5	mg/L		11-JUL-16	R3500260
Cadmium (Cd)	0.0102		0.0050	mg/L		11-JUL-16	R3500260
Chromium (Cr)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Lead (Pb)	<0.050		0.050	mg/L		11-JUL-16	R3500260
Mercury (Hg)	<0.00010		0.00010	mg/L		11-JUL-16	R3500959
Selenium (Se)	<0.025		0.025	mg/L		11-JUL-16	R3500260
Silver (Ag)	<0.0050		0.0050	mg/L		11-JUL-16	R3500260
Uranium (U)	<0.25		0.25	mg/L		11-JUL-16	R3500260
Zinc (Zn)-Total	57	DLHC	10	mg/L		11-JUL-16	R3500260

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1793580 Report Date: 13-JUL-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3498335								
WG2342784-3 DUP		**L1794767-7**						
% Moisture		11.9	11.5		%	2.7	20	08-JUL-16
WG2342784-2 LCS								
% Moisture			100.0		%		90-110	08-JUL-16
WG2342784-1 MB								
% Moisture			<0.10		%		0.1	08-JUL-16
HG-TCLP-WT	**Waste**							
Batch R3500959								
WG2344720-3 DUP		**L1794334-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	11-JUL-16
WG2344720-2 LCS								
Mercury (Hg)			99.4		%		70-130	11-JUL-16
WG2344720-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	11-JUL-16
WG2344720-4 MS		**L1794762-1**						
Mercury (Hg)			87.3		%		50-140	11-JUL-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3500260								
WG2343890-4 DUP		**WG2343890-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	11-JUL-16
WG2343890-2 LCS								
Zinc (Zn)-Total			93.0		%		70-130	08-JUL-16
WG2343890-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	11-JUL-16
WG2343890-5 MS		**WG2343890-3**						
Zinc (Zn)-Total			89.8		%		70-130	11-JUL-16
MET-TCLP-WT	**Waste**							
Batch R3500260								
WG2343890-4 DUP		**WG2343890-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	08-JUL-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	08-JUL-16
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	08-JUL-16
Barium (Ba)		<0.50	0.59	RPD-NA	mg/L	N/A	40	08-JUL-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	08-JUL-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	08-JUL-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	08-JUL-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT		**Waste**							
Batch	**R3500260**								
WG2343890-4	**DUP**		**WG2343890-3**						
Selenium (Se)			<0.025	<0.025	RPD-NA	mg/L	N/A	40	08-JUL-16
Uranium (U)			<0.25	<0.25	RPD-NA	mg/L	N/A	40	08-JUL-16
WG2343890-2	**LCS**								
Silver (Ag)				98.6		%		70-130	08-JUL-16
Arsenic (As)				97.1		%		70-130	08-JUL-16
Boron (B)				102.6		%		70-130	08-JUL-16
Barium (Ba)				99.8		%		70-130	08-JUL-16
Cadmium (Cd)				102.0		%		70-130	08-JUL-16
Chromium (Cr)				98.2		%		70-130	08-JUL-16
Lead (Pb)				100.7		%		70-130	08-JUL-16
Selenium (Se)				96.5		%		70-130	08-JUL-16
Uranium (U)				101.2		%		70-130	08-JUL-16
WG2343890-1	**MB**								
Silver (Ag)				<0.0050		mg/L		0.005	11-JUL-16
Arsenic (As)				<0.050		mg/L		0.05	11-JUL-16
Boron (B)				<2.5		mg/L		2.5	11-JUL-16
Barium (Ba)				<0.50		mg/L		0.5	11-JUL-16
Cadmium (Cd)				<0.0050		mg/L		0.005	11-JUL-16
Chromium (Cr)				<0.050		mg/L		0.05	11-JUL-16
Lead (Pb)				<0.050		mg/L		0.05	11-JUL-16
Selenium (Se)				<0.025		mg/L		0.025	11-JUL-16
Uranium (U)				<0.25		mg/L		0.25	11-JUL-16
WG2343890-5	**MS**		**WG2343890-3**						
Silver (Ag)				113.9		%		50-150	11-JUL-16
Arsenic (As)				95.2		%		50-150	11-JUL-16
Boron (B)				98.4		%		50-150	11-JUL-16
Barium (Ba)				101.7		%		50-150	11-JUL-16
Cadmium (Cd)				93.1		%		50-150	11-JUL-16
Chromium (Cr)				90.1		%		50-150	11-JUL-16
Lead (Pb)				88.0		%		50-150	11-JUL-16
Selenium (Se)				89.7		%		50-150	11-JUL-16
Uranium (U)				88.8		%		50-150	11-JUL-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

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Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Bill Bowden 2016 07 05

Mine Site- ASH COC Released on 16-07-05

Samples taken on 5-Jul-16

Ash Sample Composite Reference		
MS-ASH-135	MS-COMP-6	
MS-ASH-136	MS-COMP-6	– 1
MS-ASH-137	MS-COMP-6	
MS-ASH-138	MS-COMP-6	
MS-ASH-139	MS-COMP-7	– 2
MS-ASH-140	MS-COMP-7	
MS-ASH-141	No composite	– 3
MS-HA-193	No composite	– 4

L1793580

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1793580-COFC

COC Number: 14 -

Page 1 of 1

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ Yes ☐ No
☑ Criteria on Report - provide details below if box checked
Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax bimcore@alsglobal.com
Email 2 bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To

Same as Report To ☑ Yes ☐ No
Copy of Invoice with Report ☐ Yes ☑ No
Company:
Contact:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com
Email 2

Project Information	
ALS Quote #:	Q42455
Job #:	MINE SITE - ASH
PO / AFE:	4500017476
LSD:	

Oil and Gas Required Fields (client use)	
Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only) L1793580

ALS Contact: Wayne Smith   Sampler: KM/NF

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn)	Number of Containers
1	MS-ASH-135	5-Jul-16	23:11	Soil	R	1
2	MS-ASH-136	5-Jul-16	23:11	Soil	R	1
3	MS-ASH-137	5-Jul-16	23:17	Soil	R	1
4	MS-ASH-138	5-Jul-16	23:11	Soil	R	1
5	MS-ASH-139	5-Jul-16	23:11	Soil	R	1
6	MS-ASH-140	5-Jul-16	23:17	Soil	R	1
7	MS-ASH-141	5-Jul-16	23:19	Soil	R	2
8	MS-HA-193	5-Jul-16	23:22	Soil	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No
Are samples for human drinking water use? ☐ Yes ☐ No

Please see 16 07 05 ALS MS ASH-135 - 141 ash composite reference word document for specific ash composite instructions.

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐   SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐   Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐
INITIAL COOLER TEMPERATURES °C   FINAL COOLER TEMPERATURES °C 2.8.0

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Bill Bowden	Date: 16-07-05	Time: 9:00	Received by:	Date:	Time:	Received by: [signature]	Date: 7 JUL 16	Time: @ 1000

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION   WHITE - LABORATORY COPY   YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Baffinland Iron Mine’s Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 20-AUG-16
Report Date: 31-AUG-16 12:28 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1819610
Project P.O. #: 4500017476
Job Reference: MINE SITE-ASH
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1819610-1 MS-ASH-142							
Sampled By: KM/NF on 19-AUG-16 @ 12:21							
Matrix: SOIL							
Sample Preparation							
Initial pH	12.19		0.10	pH units	28-AUG-16	28-AUG-16	R3537781
Final pH	6.98		0.10	pH units	28-AUG-16	28-AUG-16	R3537781
Physical Tests							
% Moisture	<0.10		0.10	%	26-AUG-16	27-AUG-16	R3535012
TCLP Metals							
Arsenic (As)	0.050		0.050	mg/L		30-AUG-16	R3536551
Barium (Ba)	<0.50		0.50	mg/L		30-AUG-16	R3536551
Boron (B)	3.1		2.5	mg/L		30-AUG-16	R3536551
Cadmium (Cd)	<0.0050		0.0050	mg/L		30-AUG-16	R3536551
Chromium (Cr)	<0.050		0.050	mg/L		30-AUG-16	R3536551
Lead (Pb)	<0.050		0.050	mg/L		30-AUG-16	R3536551
Mercury (Hg)	<0.00010		0.00010	mg/L		30-AUG-16	R3536939
Selenium (Se)	<0.025		0.025	mg/L		30-AUG-16	R3536551
Silver (Ag)	<0.0050		0.0050	mg/L		30-AUG-16	R3536551
Uranium (U)	<0.25		0.25	mg/L		30-AUG-16	R3536551
Zinc (Zn)-Total	<1.0		1.0	mg/L		30-AUG-16	R3536551

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311
Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).			
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
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ALS Environmental

Quality Control Report

Workorder: L1819610 Report Date: 31-AUG-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3535012								
WG2376215-3 DUP		**L1819543-6**						
% Moisture		7.67	7.69		%	0.3	20	27-AUG-16
WG2376215-2 LCS								
% Moisture			99.6		%		90-110	27-AUG-16
WG2376215-1 MB								
% Moisture			<0.10		%		0.1	27-AUG-16
HG-TCLP-WT	**Waste**							
Batch R3536939								
WG2378115-3 DUP		**L1818295-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	30-AUG-16
WG2378115-2 LCS								
Mercury (Hg)			105.0		%		70-130	30-AUG-16
WG2378115-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	30-AUG-16
WG2378115-4 MS		**L1819610-1**						
Mercury (Hg)			90.0		%		50-140	30-AUG-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3536551								
WG2377873-4 DUP		**WG2377873-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	30-AUG-16
WG2377873-2 LCS								
Zinc (Zn)-Total			90.3		%		70-130	30-AUG-16
WG2377873-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	30-AUG-16
WG2377873-5 MS		**WG2377873-3**						
Zinc (Zn)-Total			97.6		%		70-130	30-AUG-16
MET-TCLP-WT	**Waste**							
Batch R3536551								
WG2377873-4 DUP		**WG2377873-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	30-AUG-16
Arsenic (As)		0.050	<0.050	RPD-NA	mg/L	N/A	40	30-AUG-16
Boron (B)		3.1	3.0		mg/L	3.4	40	30-AUG-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	30-AUG-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	30-AUG-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	30-AUG-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	30-AUG-16

ALS Environmental

Quality Control Report

Workorder: L1819610 Report Date: 31-AUG-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3536551								
WG2377873-4 DUP		**WG2377873-3**						
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	30-AUG-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	30-AUG-16
WG2377873-2 LCS								
Silver (Ag)			100.3		%		70-130	30-AUG-16
Arsenic (As)			99.6		%		70-130	30-AUG-16
Boron (B)			96.0		%		70-130	30-AUG-16
Barium (Ba)			95.5		%		70-130	30-AUG-16
Cadmium (Cd)			98.0		%		70-130	30-AUG-16
Chromium (Cr)			97.8		%		70-130	30-AUG-16
Lead (Pb)			98.7		%		70-130	30-AUG-16
Selenium (Se)			99.0		%		70-130	30-AUG-16
Uranium (U)			99.7		%		70-130	30-AUG-16
WG2377873-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	30-AUG-16
Arsenic (As)			<0.050		mg/L		0.05	30-AUG-16
Boron (B)			<2.5		mg/L		2.5	30-AUG-16
Barium (Ba)			<0.50		mg/L		0.5	30-AUG-16
Cadmium (Cd)			<0.0050		mg/L		0.005	30-AUG-16
Chromium (Cr)			<0.050		mg/L		0.05	30-AUG-16
Lead (Pb)			<0.050		mg/L		0.05	30-AUG-16
Selenium (Se)			<0.025		mg/L		0.025	30-AUG-16
Uranium (U)			<0.25		mg/L		0.25	30-AUG-16
WG2377873-5 MS		**WG2377873-3**						
Silver (Ag)			120.3		%		50-150	30-AUG-16
Arsenic (As)			107.8		%		50-150	30-AUG-16
Boron (B)			100.6		%		50-150	30-AUG-16
Barium (Ba)			103.3		%		50-150	30-AUG-16
Cadmium (Cd)			109.6		%		50-150	30-AUG-16
Chromium (Cr)			106.1		%		50-150	30-AUG-16
Lead (Pb)			103.5		%		50-150	30-AUG-16
Selenium (Se)			105.6		%		50-150	30-AUG-16
Uranium (U)			112.1		%		50-150	30-AUG-16

Quality Control Report

Workorder: L1819610 Report Date: 31-AUG-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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Chain of Custody (COC) / Analytica Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1819610-COFC

COC Number: 14 -

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Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution	
Select Report Format:	☑PDF ☑EXCEL ☑EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ Yes ☐ No
☑Criteria on Report - provide details below if box checked	
Select Distribution:	☐EMAIL ☐MAIL ☐FAX
Email 1 or Fax	bimcore@alsglobal.com
Email 2	bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑Regular (Standard TAT if received by 3 pm - business days)
- P ☐Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	
Same as Report To	☑ Yes ☐ No
Copy of Invoice with Report	☐ Yes ☑ No
Company:	
Contact:	

Invoice Distribution	
Select Invoice Distribution:	☑EMAIL ☐MAIL ☐FAX
Email 1 or Fax	ap@baffinland.com
Email 2	

Project Information	
ALS Quote #:	Q42455
Job #:	MINE SITE - ASH
PO / AFE:	4500017476
LSD:	

Oil and Gas Required Fields (client use)	
Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only): Aug 26 L1819610 a9

ALS Contact: Wayne Smith | Sampler: KM/NF

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn)	Number of Containers
1	MS-ASH-142	19-Aug-16	12:21	Soil	R	2

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☐ No

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☑
Ice packs	Yes ☐ No ☑	Custody seal intact	Yes ☐	No ☑
Cooling Initiated	☐			

INITIAL COOLER TEMPERATURES °C: 1.5

FINAL COOLER TEMPERATURES °C: 0.6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Bill Bowden	Date: 16-08-19	12:00	Received by: [illegible]	Date: [illegible]	Time: [illegible]	Received by: [signature]	Date: 26 Aug 16	Time: @900

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

SH

Baffinland Iron Mine's Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 06-OCT-16
Report Date: 13-OCT-16 12:18 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1839612

Project P.O. #: 4500017476
Job Reference: MS-ASH-143
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839612-1 MS-ASH-143 Sampled By: BP on 29-SEP-16 @ 18:20 Matrix: SOIL							
Sample Preparation							
Initial pH	12.22		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	7.49		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	0.14		0.10	%	06-OCT-16	07-OCT-16	R3565980
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	1.32		0.50	mg/L		13-OCT-16	R3569831
Boron (B)	4.1		2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	0.594		0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025		0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25		0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0		1.0	mg/L		13-OCT-16	R3569831

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1839612 Report Date: 13-OCT-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3565980								
WG2405005-3 DUP		**L1838934-13**						
% Moisture		5.67	5.54		%	2.3	20	07-OCT-16
WG2405005-2 LCS								
% Moisture			103.8		%		90-110	07-OCT-16
WG2405005-1 MB								
% Moisture			<0.10		%		0.1	07-OCT-16
HG-TCLP-WT	**Waste**							
Batch R3570054								
WG2409503-3 DUP		**L1839605-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	13-OCT-16
WG2409503-2 LCS								
Mercury (Hg)			104.0		%		70-130	13-OCT-16
WG2409503-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	13-OCT-16
WG2409503-4 MS		**L1839612-1**						
Mercury (Hg)			96.3		%		50-140	13-OCT-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3569831								
WG2408843-4 DUP		**WG2408843-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	13-OCT-16
WG2408843-2 LCS								
Zinc (Zn)-Total			91.8		%		70-130	13-OCT-16
WG2408843-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	13-OCT-16
WG2408843-5 MS		**WG2408843-3**						
Zinc (Zn)-Total			93.6		%		70-130	13-OCT-16
MET-TCLP-WT	**Waste**							
Batch R3569831								
WG2408843-4 DUP		**WG2408843-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	13-OCT-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	13-OCT-16
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	13-OCT-16
Barium (Ba)		0.51	0.53		mg/L	2.7	40	13-OCT-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	13-OCT-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	13-OCT-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	13-OCT-16

ALS Environmental

Quality Control Report

Workorder: L1839612 Report Date: 13-OCT-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3569831								
WG2408843-4 DUP		**WG2408843-3**						
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	13-OCT-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	13-OCT-16
WG2408843-2 LCS								
Silver (Ag)			95.1		%		70-130	13-OCT-16
Arsenic (As)			96.0		%		70-130	13-OCT-16
Boron (B)			97.7		%		70-130	13-OCT-16
Barium (Ba)			99.4		%		70-130	13-OCT-16
Cadmium (Cd)			97.1		%		70-130	13-OCT-16
Chromium (Cr)			96.0		%		70-130	13-OCT-16
Lead (Pb)			97.7		%		70-130	13-OCT-16
Selenium (Se)			93.0		%		70-130	13-OCT-16
Uranium (U)			95.7		%		70-130	13-OCT-16
WG2408843-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	13-OCT-16
Arsenic (As)			<0.050		mg/L		0.05	13-OCT-16
Boron (B)			<2.5		mg/L		2.5	13-OCT-16
Barium (Ba)			<0.50		mg/L		0.5	13-OCT-16
Cadmium (Cd)			<0.0050		mg/L		0.005	13-OCT-16
Chromium (Cr)			<0.050		mg/L		0.05	13-OCT-16
Lead (Pb)			<0.050		mg/L		0.05	13-OCT-16
Selenium (Se)			<0.025		mg/L		0.025	13-OCT-16
Uranium (U)			<0.25		mg/L		0.25	13-OCT-16
WG2408843-5 MS		**WG2408843-3**						
Silver (Ag)			109.2		%		50-150	13-OCT-16
Arsenic (As)			99.3		%		50-150	13-OCT-16
Boron (B)			132.3		%		50-150	13-OCT-16
Barium (Ba)			110.5		%		50-150	13-OCT-16
Cadmium (Cd)			101.2		%		50-150	13-OCT-16
Chromium (Cr)			140.0		%		50-150	13-OCT-16
Lead (Pb)			92.8		%		50-150	13-OCT-16
Selenium (Se)			96.3		%		50-150	13-OCT-16
Uranium (U)			91.6		%		50-150	13-OCT-16

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1839612-COFC

COC Number: 14 -

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☑ Criteria on Report - provide details below if box checked Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0596 EXT 6010	Email 1 or Fax	bimcore@alsglobal.com	Specify Date Required for E2,E or P:
		Email 2	bimww@alsglobal.com	Analysis Request

Invoice To		Invoice Distribution	
Same as Report To	☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Copy of Invoice with Report	☐ Yes ☑ No	Email 1 or Fax	ap@baffinland.com
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MS-ASH-143	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	L1839612 R4 GLA	ALS Contact: Wayne Smith	Sampler: BP

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn) -	Number of Containers
	MS-ASH-143	29-Sep-16	18:20	Soil	R	2

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐		SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☐ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated ☑			
INITIAL COOLER TEMPERATURES °C	4.5	FINAL COOLER TEMPERATURES °C	15.0

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katie Babin	Date: 16 10 02	Time: 9:00	Received by: [signature]	Date: 9/30/16	Time: 09:00	Received by: [signature]	Date: 16 Oct 02	Time: 1000

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Baffinland Iron Mine's Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 01-DEC-16
Report Date: 05-DEC-16 13:58 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1864851

Project P.O. #: 4500017476
Job Reference: MS-ASH
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1864851-1 MS-ASH-144 Sampled By: KB on 28-NOV-16 @ 14:10 Matrix: SOIL							
Sample Preparation							
Initial pH	12.55		0.10	pH units	03-DEC-16	03-DEC-16	R3610785
Final pH	10.96		0.10	pH units	03-DEC-16	03-DEC-16	R3610785
Physical Tests							
% Moisture	<0.10		0.10	%	01-DEC-16	01-DEC-16	R3608565
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		05-DEC-16	R3610734
Barium (Ba)	<0.50		0.50	mg/L		05-DEC-16	R3610734
Boron (B)	3.2		2.5	mg/L		05-DEC-16	R3610734
Cadmium (Cd)	<0.0050		0.0050	mg/L		05-DEC-16	R3610734
Chromium (Cr)	0.506		0.050	mg/L		05-DEC-16	R3610734
Lead (Pb)	<0.050		0.050	mg/L		05-DEC-16	R3610734
Mercury (Hg)	<0.00010		0.00010	mg/L		05-DEC-16	R3610750
Selenium (Se)	<0.025		0.025	mg/L		05-DEC-16	R3610734
Silver (Ag)	<0.0050		0.0050	mg/L		05-DEC-16	R3610734
Uranium (U)	<0.25		0.25	mg/L		05-DEC-16	R3610734
Zinc (Zn)-Total	<1.0		1.0	mg/L		05-DEC-16	R3610734
L1864851-2 MS-ASH-145 Sampled By: KB on 28-NOV-16 @ 14:00 Matrix: SOIL							
Sample Preparation							
Initial pH	12.50		0.10	pH units	03-DEC-16	03-DEC-16	R3610785
Final pH	7.18		0.10	pH units	03-DEC-16	03-DEC-16	R3610785
Physical Tests							
% Moisture	4.15		0.10	%	01-DEC-16	01-DEC-16	R3608565
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		05-DEC-16	R3610734
Barium (Ba)	<0.50		0.50	mg/L		05-DEC-16	R3610734
Boron (B)	3.0		2.5	mg/L		05-DEC-16	R3610734
Cadmium (Cd)	<0.0050		0.0050	mg/L		05-DEC-16	R3610734
Chromium (Cr)	<0.050		0.050	mg/L		05-DEC-16	R3610734
Lead (Pb)	<0.050		0.050	mg/L		05-DEC-16	R3610734
Mercury (Hg)	<0.00010		0.00010	mg/L		05-DEC-16	R3610750
Selenium (Se)	<0.025		0.025	mg/L		05-DEC-16	R3610734
Silver (Ag)	<0.0050		0.0050	mg/L		05-DEC-16	R3610734
Uranium (U)	<0.25		0.25	mg/L		05-DEC-16	R3610734
Zinc (Zn)-Total	<1.0		1.0	mg/L		05-DEC-16	R3610734

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3608565								
WG2443821-3 DUP		**L1864759-2**						
% Moisture		7.12	7.13		%	0.1	20	01-DEC-16
WG2443821-2 LCS								
% Moisture			100.1		%		90-110	01-DEC-16
WG2443821-1 MB								
% Moisture			<0.10		%		0.1	01-DEC-16
HG-TCLP-WT	**Waste**							
Batch R3610750								
WG2445835-3 DUP		**L1864851-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	05-DEC-16
WG2445835-2 LCS								
Mercury (Hg)			95.4		%		70-130	05-DEC-16
WG2445835-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	05-DEC-16
WG2445835-4 MS		**L1864851-1**						
Mercury (Hg)			83.7		%		50-140	05-DEC-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3610734								
WG2445749-4 DUP		**WG2445749-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	05-DEC-16
WG2445749-2 LCS								
Zinc (Zn)-Total			92.9		%		70-130	05-DEC-16
WG2445749-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	05-DEC-16
WG2445749-5 MS		**WG2445749-3**						
Zinc (Zn)-Total			96.3		%		70-130	05-DEC-16
MET-TCLP-WT	**Waste**							
Batch R3610734								
WG2445749-4 DUP		**WG2445749-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	05-DEC-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	05-DEC-16
Boron (B)		3.2	3.4		mg/L	3.4	40	05-DEC-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	05-DEC-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	05-DEC-16
Chromium (Cr)		0.506	0.519		mg/L	2.5	40	05-DEC-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	05-DEC-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3610734								
WG2445749-4 DUP		**WG2445749-3**						
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	05-DEC-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	05-DEC-16
WG2445749-2 LCS								
Silver (Ag)			99.7		%		70-130	05-DEC-16
Arsenic (As)			97.5		%		70-130	05-DEC-16
Boron (B)			104.1		%		70-130	05-DEC-16
Barium (Ba)			99.8		%		70-130	05-DEC-16
Cadmium (Cd)			101.6		%		70-130	05-DEC-16
Chromium (Cr)			98.1		%		70-130	05-DEC-16
Lead (Pb)			107.7		%		70-130	05-DEC-16
Selenium (Se)			100.0		%		70-130	05-DEC-16
Uranium (U)			108.2		%		70-130	05-DEC-16
WG2445749-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	05-DEC-16
Arsenic (As)			<0.050		mg/L		0.05	05-DEC-16
Boron (B)			<2.5		mg/L		2.5	05-DEC-16
Barium (Ba)			<0.50		mg/L		0.5	05-DEC-16
Cadmium (Cd)			<0.0050		mg/L		0.005	05-DEC-16
Chromium (Cr)			<0.050		mg/L		0.05	05-DEC-16
Lead (Pb)			<0.050		mg/L		0.05	05-DEC-16
Selenium (Se)			<0.025		mg/L		0.025	05-DEC-16
Uranium (U)			<0.25		mg/L		0.25	05-DEC-16
WG2445749-5 MS		**WG2445749-3**						
Silver (Ag)			122.4		%		50-150	05-DEC-16
Arsenic (As)			100.7		%		50-150	05-DEC-16
Boron (B)			96.2		%		50-150	05-DEC-16
Barium (Ba)			104.1		%		50-150	05-DEC-16
Cadmium (Cd)			103.0		%		50-150	05-DEC-16
Chromium (Cr)			100.1		%		50-150	05-DEC-16
Lead (Pb)			97.1		%		50-150	05-DEC-16
Selenium (Se)			99.0		%		50-150	05-DEC-16
Uranium (U)			99.5		%		50-150	05-DEC-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1864851-COFC

COC Number: 14 -

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax bimcore@alsglobal.com

Email 2 bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To Same as Report To ☑ Yes ☐ No

Copy of Invoice with Report ☐ Yes ☑ No

Company:

Contact:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com

Email 2

Project Information

ALS Quote #:	Q42455
Job #:	MS-ASH
PO / AFE:	4500017476
LSD:	

Oil and Gas Required Fields (client use)

Approver ID: Cost Center:

GL Account: Routing Code:

Activity Code:

Location:

ALS Lab Work Order # (lab use only) L1864851 R4 17

ALS Contact: Wayne Smith Sampler: KB

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn) -	Number of Containers
1	MS-ASH-144	28-Nov-16	14:10	Soil	R	2
2	MS-ASH-145	28-Nov-16	14:00	Soil	R	2

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C 12.2

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)	
Released by: Katie Babin	Date: 28 Nov 201	16:00	Received by:	Date:	Time:	Received by: MH	Date: DEC 6 Time: 900

Baffinland Iron Mine's Corporation
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 25-MAY-16
Report Date: 08-JUN-16 11:32 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1776293

Project P.O. #: 4500017476
Job Reference: MILNE PORT - ASH
C of C Numbers:
Legal Site Desc:

Austin Paterson
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1776293-1 MP-ASH-COMP9 Sampled By: BB on 12-MAY-16 Matrix: SOIL							
Sample Preparation							
Initial pH	11.35		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	10.95		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							
% Moisture	0.73		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	<0.50		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	3.1		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	0.852		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547
L1776293-2 MP-ASH-COMP10 Sampled By: BB on 13-MAY-16 Matrix: SOIL							
Sample Preparation							
Initial pH	11.69		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	9.74		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							
% Moisture	0.58		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	0.58		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	3.3		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	4.04		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547
L1776293-3 MP-ASH-COMP11 Sampled By: BB on 13-MAY-16 Matrix: SOIL							
Sample Preparation							
Initial pH	11.88		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	12.27		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1776293-3 MP-ASH-COMP11 Sampled By: BB on 13-MAY-16 Matrix: SOIL							
Physical Tests							
% Moisture	0.30		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	0.72		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	<2.5		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	1.43		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547
L1776293-4 MP-ASH-COMP12 Sampled By: BB on 14-MAY-16 Matrix: SOIL							
Sample Preparation							
Initial pH	12.30		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	10.84		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							
% Moisture	0.45		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	0.51		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	<2.5		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	0.158		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547
L1776293-5 MP-ASH-COMP13 Sampled By: BB on 14-MAY-16 Matrix: SOIL							
Sample Preparation							
Initial pH	11.63		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	9.12		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							
% Moisture	<0.10		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1776293-5 MP-ASH-COMP13 Sampled By: BB on 14-MAY-16 Matrix: SOIL							
TCLP Metals							
Barium (Ba)	<0.50		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	6.5		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	0.171		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547
L1776293-6 MP-ASH-COMP14 Sampled By: BB on 14-MAY-16 Matrix: SOIL							
Sample Preparation							
Initial pH	12.10		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	9.56		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							
% Moisture	0.36		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	<0.50		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	4.7		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	1.57		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311
Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).			
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3471796								
WG2320428-3 DUP		**L1777859-1**						
% Moisture		14.2	14.1		%	0.7	20	04-JUN-16
WG2320428-2 LCS								
% Moisture			95.0		%		90-110	04-JUN-16
WG2320428-1 MB								
% Moisture			<0.10		%		0.1	04-JUN-16
HG-TCLP-WT	**Waste**							
Batch R3474843								
WG2323188-3 DUP		**L1776293-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	08-JUN-16
WG2323188-2 LCS								
Mercury (Hg)			106.0		%		70-130	08-JUN-16
WG2323188-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	08-JUN-16
WG2323188-4 MS		**L1776293-1**						
Mercury (Hg)			96.3		%		50-140	08-JUN-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3474547								
WG2322727-4 DUP		**WG2322727-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	07-JUN-16
WG2322727-2 LCS								
Zinc (Zn)-Total			100.9		%		70-130	07-JUN-16
WG2322727-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	07-JUN-16
WG2322727-5 MS		**WG2322727-3**						
Zinc (Zn)-Total			114.2		%		70-130	07-JUN-16
MET-TCLP-WT	**Waste**							
Batch R3474547								
WG2322727-4 DUP		**WG2322727-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	07-JUN-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	07-JUN-16
Boron (B)		3.1	3.8		mg/L	20	40	07-JUN-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	07-JUN-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	07-JUN-16
Chromium (Cr)		0.852	1.11		mg/L	26	40	07-JUN-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	07-JUN-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3474547								
WG2322727-4 DUP		**WG2322727-3**						
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	07-JUN-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	07-JUN-16
WG2322727-2 LCS								
Silver (Ag)			107.5		%		70-130	07-JUN-16
Arsenic (As)			107.9		%		70-130	07-JUN-16
Boron (B)			97.4		%		70-130	07-JUN-16
Barium (Ba)			111.1		%		70-130	07-JUN-16
Cadmium (Cd)			110.7		%		70-130	07-JUN-16
Chromium (Cr)			107.1		%		70-130	07-JUN-16
Lead (Pb)			107.0		%		70-130	07-JUN-16
Selenium (Se)			108.2		%		70-130	07-JUN-16
Uranium (U)			107.5		%		70-130	07-JUN-16
WG2322727-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	07-JUN-16
Arsenic (As)			<0.050		mg/L		0.05	07-JUN-16
Boron (B)			<2.5		mg/L		2.5	07-JUN-16
Barium (Ba)			<0.50		mg/L		0.5	07-JUN-16
Cadmium (Cd)			<0.0050		mg/L		0.005	07-JUN-16
Chromium (Cr)			<0.050		mg/L		0.05	07-JUN-16
Lead (Pb)			<0.050		mg/L		0.05	07-JUN-16
Selenium (Se)			<0.025		mg/L		0.025	07-JUN-16
Uranium (U)			<0.25		mg/L		0.25	07-JUN-16
WG2322727-5 MS		**WG2322727-3**						
Silver (Ag)			126.5		%		50-150	07-JUN-16
Arsenic (As)			118.9		%		50-150	07-JUN-16
Boron (B)			108.7		%		50-150	07-JUN-16
Barium (Ba)			123.9		%		50-150	07-JUN-16
Cadmium (Cd)			111.3		%		50-150	07-JUN-16
Chromium (Cr)			127.6		%		50-150	07-JUN-16
Lead (Pb)			104.4		%		50-150	07-JUN-16
Selenium (Se)			116.0		%		50-150	07-JUN-16
Uranium (U)			108.8		%		50-150	07-JUN-16

Quality Control Report

Workorder: L1776293 Report Date: 08-JUN-16

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1776293 Report Date: 08-JUN-16

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
% Moisture							
	1	12-MAY-16	04-JUN-16 11:16	14	23	days	EHT
	2	13-MAY-16	04-JUN-16 11:17	14	22	days	EHT
	3	13-MAY-16	04-JUN-16 11:18	14	22	days	EHT
	4	14-MAY-16	04-JUN-16 11:19	14	21	days	EHT
	5	14-MAY-16	04-JUN-16 11:20	14	21	days	EHT
	6	14-MAY-16	04-JUN-16 11:21	14	21	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1776293 were received on 25-MAY-16 06:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1776293-COFC

COC Number: 14 -

Page 1 of 1

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: bimcore@alsglobal.com

Email 2: bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To		
Same as Report To	☑ Yes	☐ No
Copy of Invoice with Report	☐ Yes	☑ No
Company:		
Contact:		

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: ap@baffinland.com

Email 2:

Project Information

ALS Quote #:	Q42455
Job #:	MILNE PORT - ASH
PO / AFE:	4500017476
LSD:	

Oil and Gas Required Fields (client use)

Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only): L1776293

ALS Contact: Wayne Smith

Sampler: BB

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn)	Number of Containers
1	MP-ASH-COMP9	12-May-16	-	Soil	R	4
2	MP-ASH-COMP10	13-May-16	-	Soil	R	4
3	MP-ASH-COMP11	13-May-16	-	Soil	R	4
4	MP-ASH-COMP12	14-May-16	-	Soil	R	4
5	MP-ASH-COMP13	14-May-16	-	Soil	R	4
6	MP-ASH-COMP14	14-May-16	-	Soil	R	4

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 10°C

FINAL COOLER TEMPERATURES °C: 20.7

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Andrew Vermeer	Date: 25-May-16	Time: 1:00	Received by: Matt Evans	Date: May 25, 16	Time: 6:30am	Received by: [signature]	Date: 3 Jun 2016	Time: 0945

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

Baffinland Iron Mine's Corporation
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 26-MAY-16
Report Date: 08-JUN-16 11:45 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1776294
Project P.O. #: 4500017476
Job Reference: MILNE PORT - ASH
C of C Numbers:
Legal Site Desc:

Austin Paterson
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1776294-1 MP-ASH-COMP15							
Sampled By: EA/KB on 24-MAY-16 @ 16:15							
Matrix: SOIL							
Sample Preparation							
Initial pH	11.93		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	6.87		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							
% Moisture	10.0		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	<0.50		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	5.6		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547
L1776294-2 MP-ASH-COMP16							
Sampled By: EA/KB on 24-MAY-16 @ 16:35							
Matrix: SOIL							
Sample Preparation							
Initial pH	11.72		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	8.10		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							
% Moisture	6.02		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	<0.50		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	5.9		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	2.96		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547
L1776294-3 MP-ASH-COMP17							
Sampled By: EA/KB on 24-MAY-16 @ 16:50							
Matrix: SOIL							
Sample Preparation							
Initial pH	11.94		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	9.45		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1776294-3 MP-ASH-COMP17							
Sampled By: EA/KB on 24-MAY-16 @ 16:50							
Matrix: SOIL							
Physical Tests							
% Moisture	1.37		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	<0.50		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	4.4		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	0.941		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547
L1776294-4 MP-ASH-COMP18							
Sampled By: EA/KB on 24-MAY-16 @ 17:00							
Matrix: SOIL							
Sample Preparation							
Initial pH	11.46		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Final pH	10.95		0.10	pH units	06-JUN-16	06-JUN-16	R3474833
Physical Tests							
% Moisture	<0.10		0.10	%	03-JUN-16	04-JUN-16	R3471796
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Barium (Ba)	<0.50		0.50	mg/L		07-JUN-16	R3474547
Boron (B)	3.9		2.5	mg/L		07-JUN-16	R3474547
Cadmium (Cd)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Chromium (Cr)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Lead (Pb)	<0.050		0.050	mg/L		07-JUN-16	R3474547
Mercury (Hg)	<0.00010		0.00010	mg/L		08-JUN-16	R3474843
Selenium (Se)	<0.025		0.025	mg/L		07-JUN-16	R3474547
Silver (Ag)	<0.0050		0.0050	mg/L		07-JUN-16	R3474547
Uranium (U)	<0.25		0.25	mg/L		07-JUN-16	R3474547
Zinc (Zn)-Total	<1.0		1.0	mg/L		07-JUN-16	R3474547

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1776294 Report Date: 08-JUN-16

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3471796								
WG2320428-3 DUP		**L1777859-1**						
% Moisture		14.2	14.1		%	0.7	20	04-JUN-16
WG2320428-2 LCS								
% Moisture			95.0		%		90-110	04-JUN-16
WG2320428-1 MB								
% Moisture			<0.10		%		0.1	04-JUN-16
HG-TCLP-WT	**Waste**							
Batch R3474843								
WG2323188-3 DUP		**L1776293-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	08-JUN-16
WG2323188-2 LCS								
Mercury (Hg)			106.0		%		70-130	08-JUN-16
WG2323188-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	08-JUN-16
WG2323188-4 MS		**L1776293-1**						
Mercury (Hg)			96.3		%		50-140	08-JUN-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3474547								
WG2322727-4 DUP		**WG2322727-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	07-JUN-16
WG2322727-2 LCS								
Zinc (Zn)-Total			100.9		%		70-130	07-JUN-16
WG2322727-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	07-JUN-16
WG2322727-5 MS		**WG2322727-3**						
Zinc (Zn)-Total			114.2		%		70-130	07-JUN-16
MET-TCLP-WT	**Waste**							
Batch R3474547								
WG2322727-4 DUP		**WG2322727-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	07-JUN-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	07-JUN-16
Boron (B)		3.1	3.8		mg/L	20	40	07-JUN-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	07-JUN-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	07-JUN-16
Chromium (Cr)		0.852	1.11		mg/L	26	40	07-JUN-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	07-JUN-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3474547								
WG2322727-4 DUP		**WG2322727-3**						
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	07-JUN-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	07-JUN-16
WG2322727-2 LCS								
Silver (Ag)			107.5		%		70-130	07-JUN-16
Arsenic (As)			107.9		%		70-130	07-JUN-16
Boron (B)			97.4		%		70-130	07-JUN-16
Barium (Ba)			111.1		%		70-130	07-JUN-16
Cadmium (Cd)			110.7		%		70-130	07-JUN-16
Chromium (Cr)			107.1		%		70-130	07-JUN-16
Lead (Pb)			107.0		%		70-130	07-JUN-16
Selenium (Se)			108.2		%		70-130	07-JUN-16
Uranium (U)			107.5		%		70-130	07-JUN-16
WG2322727-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	07-JUN-16
Arsenic (As)			<0.050		mg/L		0.05	07-JUN-16
Boron (B)			<2.5		mg/L		2.5	07-JUN-16
Barium (Ba)			<0.50		mg/L		0.5	07-JUN-16
Cadmium (Cd)			<0.0050		mg/L		0.005	07-JUN-16
Chromium (Cr)			<0.050		mg/L		0.05	07-JUN-16
Lead (Pb)			<0.050		mg/L		0.05	07-JUN-16
Selenium (Se)			<0.025		mg/L		0.025	07-JUN-16
Uranium (U)			<0.25		mg/L		0.25	07-JUN-16
WG2322727-5 MS		**WG2322727-3**						
Silver (Ag)			126.5		%		50-150	07-JUN-16
Arsenic (As)			118.9		%		50-150	07-JUN-16
Boron (B)			108.7		%		50-150	07-JUN-16
Barium (Ba)			123.9		%		50-150	07-JUN-16
Cadmium (Cd)			111.3		%		50-150	07-JUN-16
Chromium (Cr)			127.6		%		50-150	07-JUN-16
Lead (Pb)			104.4		%		50-150	07-JUN-16
Selenium (Se)			116.0		%		50-150	07-JUN-16
Uranium (U)			108.8		%		50-150	07-JUN-16

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1776294-COFC

COC Number: 14 -

Page 1 of 1

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300, Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ Yes ☐ No
☑ Criteria on Report - provide details below if box checked	
Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	bimcore@alsglobal.com
Email 2	bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	
Same as Report To	☑ Yes ☐ No
Copy of Invoice with Report	☐ Yes ☑ No
Company:	
Contact:	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	

Project Information	
ALS Quote #:	Q42455
Job #:	MILNE PORT - ASH
PO / AFE:	4500017476
LSD:	

Oil and Gas Required Fields (client use)	
Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only): L1776294 MM

ALS Contact: Wayne Smith | Sampler: EA/KB

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn) -	Number of Containers
1	MP-ASH-COMP15	24-May-16	16:15	Soil	R	2
2	MP-ASH-COMP16	24-May-16	16:35	Soil	R	2
3	MP-ASH-COMP17	24-May-16	16:50	Soil	R	2
4	MP-ASH-COMP18	24-May-16	17:00	Soil	R	2

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐		SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☐ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated ☐			

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
15°C	20.7

SHIPMENT RELEASE (client use)		
Released by: Bill Bowden	Date: 26-May-16	Time: 14:00

INITIAL SHIPMENT RECEPTION (lab use only)		
Received by: Matt Evans	Date: May 26, 16	Time: 2:30

FINAL SHIPMENT RECEPTION (lab use only)		
Received by: MM	Date: 3 Jun 16	Time: @ 9:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Baffinland Iron Mine's Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 18-AUG-16
Report Date: 25-AUG-16 07:55 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1815462

Project P.O. #: 4500017476
Job Reference: MILNE PORT
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1815462-1 COMPOSITE 20 Sampled By: EZRA ARREAK on 13-AUG-16 Matrix: SOIL							
Sample Preparation							
Initial pH	12.16		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Final pH	9.43		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Physical Tests							
% Moisture	<0.10		0.10	%	18-AUG-16	19-AUG-16	R3528887
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Barium (Ba)	<0.50		0.50	mg/L		24-AUG-16	R3532524
Boron (B)	4.1		2.5	mg/L		24-AUG-16	R3532524
Cadmium (Cd)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Chromium (Cr)	2.29		0.050	mg/L		24-AUG-16	R3532524
Lead (Pb)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Mercury (Hg)	<0.00010		0.00010	mg/L		23-AUG-16	R3531723
Selenium (Se)	<0.025		0.025	mg/L		24-AUG-16	R3532524
Silver (Ag)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Uranium (U)	<0.25		0.25	mg/L		24-AUG-16	R3532524
Zinc (Zn)-Total	<1.0		1.0	mg/L		24-AUG-16	R3532524
L1815462-2 COMPOSITE 21 Sampled By: EZRA ARREAK on 13-AUG-16 Matrix: SOIL							
Sample Preparation							
Initial pH	12.30		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Final pH	8.41		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Physical Tests							
% Moisture	2.50		0.10	%	18-AUG-16	19-AUG-16	R3528887
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Barium (Ba)	<0.50		0.50	mg/L		24-AUG-16	R3532524
Boron (B)	4.2		2.5	mg/L		24-AUG-16	R3532524
Cadmium (Cd)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Chromium (Cr)	0.284		0.050	mg/L		24-AUG-16	R3532524
Lead (Pb)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Mercury (Hg)	<0.00010		0.00010	mg/L		23-AUG-16	R3531723
Selenium (Se)	<0.025		0.025	mg/L		24-AUG-16	R3532524
Silver (Ag)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Uranium (U)	<0.25		0.25	mg/L		24-AUG-16	R3532524
Zinc (Zn)-Total	<1.0		1.0	mg/L		24-AUG-16	R3532524
L1815462-3 COMPOSITE 22 Sampled By: EZRA ARREAK on 13-AUG-16 Matrix: SOIL							
Sample Preparation							
Initial pH	12.47		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Final pH	9.07		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1815462-3 COMPOSITE 22 Sampled By: EZRA ARREAK on 13-AUG-16 Matrix: SOIL							
Physical Tests							
% Moisture	0.46		0.10	%	18-AUG-16	19-AUG-16	R3528887
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Barium (Ba)	<0.50		0.50	mg/L		24-AUG-16	R3532524
Boron (B)	3.0		2.5	mg/L		24-AUG-16	R3532524
Cadmium (Cd)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Chromium (Cr)	4.75		0.050	mg/L		24-AUG-16	R3532524
Lead (Pb)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Mercury (Hg)	<0.00010		0.00010	mg/L		23-AUG-16	R3531723
Selenium (Se)	<0.025		0.025	mg/L		24-AUG-16	R3532524
Silver (Ag)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Uranium (U)	<0.25		0.25	mg/L		24-AUG-16	R3532524
Zinc (Zn)-Total	<1.0		1.0	mg/L		24-AUG-16	R3532524
L1815462-4 COMPOSITE 23 Sampled By: EZRA ARREAK on 13-AUG-16 Matrix: SOIL							
Sample Preparation							
Initial pH	11.52		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Final pH	7.30		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Physical Tests							
% Moisture	0.18		0.10	%	19-AUG-16	20-AUG-16	R3529323
TCLP Metals							
Arsenic (As)	0.067		0.050	mg/L		24-AUG-16	R3532524
Barium (Ba)	<0.50		0.50	mg/L		24-AUG-16	R3532524
Boron (B)	5.5		2.5	mg/L		24-AUG-16	R3532524
Cadmium (Cd)	0.0088		0.0050	mg/L		24-AUG-16	R3532524
Chromium (Cr)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Lead (Pb)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Mercury (Hg)	<0.00010		0.00010	mg/L		23-AUG-16	R3531723
Selenium (Se)	<0.025		0.025	mg/L		24-AUG-16	R3532524
Silver (Ag)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Uranium (U)	<0.25		0.25	mg/L		24-AUG-16	R3532524
Zinc (Zn)-Total	<1.0		1.0	mg/L		24-AUG-16	R3532524
L1815462-5 COMPOSITE 24 Sampled By: EZRA ARREAK on 13-AUG-16 Matrix: SOIL							
Sample Preparation							
Initial pH	11.98		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Final pH	7.67		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Physical Tests							
% Moisture	0.14		0.10	%	19-AUG-16	20-AUG-16	R3529323
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		24-AUG-16	R3532524

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1815462-5 COMPOSITE 24 Sampled By: EZRA ARREAK on 13-AUG-16 Matrix: SOIL							
TCLP Metals							
Barium (Ba)	<0.50		0.50	mg/L		24-AUG-16	R3532524
Boron (B)	4.1		2.5	mg/L		24-AUG-16	R3532524
Cadmium (Cd)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Chromium (Cr)	0.722		0.050	mg/L		24-AUG-16	R3532524
Lead (Pb)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Mercury (Hg)	<0.00010		0.00010	mg/L		23-AUG-16	R3531723
Selenium (Se)	<0.025		0.025	mg/L		24-AUG-16	R3532524
Silver (Ag)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Uranium (U)	<0.25		0.25	mg/L		24-AUG-16	R3532524
Zinc (Zn)-Total	<1.0		1.0	mg/L		24-AUG-16	R3532524
L1815462-6 COMPOSITE 25 Sampled By: EZRA ARREAK on 13-AUG-16 Matrix: SOIL							
Sample Preparation							
Initial pH	11.91		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Final pH	8.96		0.10	pH units	22-AUG-16	22-AUG-16	R3532691
Physical Tests							
% Moisture	0.60		0.10	%	19-AUG-16	20-AUG-16	R3529323
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Barium (Ba)	<0.50		0.50	mg/L		24-AUG-16	R3532524
Boron (B)	3.4		2.5	mg/L		24-AUG-16	R3532524
Cadmium (Cd)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Chromium (Cr)	0.615		0.050	mg/L		24-AUG-16	R3532524
Lead (Pb)	<0.050		0.050	mg/L		24-AUG-16	R3532524
Mercury (Hg)	<0.00010		0.00010	mg/L		23-AUG-16	R3531723
Selenium (Se)	<0.025		0.025	mg/L		24-AUG-16	R3532524
Silver (Ag)	<0.0050		0.0050	mg/L		24-AUG-16	R3532524
Uranium (U)	<0.25		0.25	mg/L		24-AUG-16	R3532524
Zinc (Zn)-Total	<1.0		1.0	mg/L		24-AUG-16	R3532524

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chromium (Cr)	MS-B	L1815462-1, -2, -3, -4, -5, -6

Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1815462 Report Date: 25-AUG-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3528887								
WG2370611-3 DUP		**L1815399-6**						
% Moisture		14.5	14.6		%	0.9	20	19-AUG-16
WG2370611-2 LCS								
% Moisture			99.8		%		90-110	19-AUG-16
WG2370611-1 MB								
% Moisture			<0.10		%		0.1	19-AUG-16
Batch R3529323								
WG2371070-3 DUP		**L1815365-1**						
% Moisture		7.82	7.77		%	0.5	20	20-AUG-16
WG2371070-2 LCS								
% Moisture			105.0		%		90-110	20-AUG-16
WG2371070-1 MB								
% Moisture			<0.10		%		0.1	20-AUG-16
HG-TCLP-WT	**Waste**							
Batch R3531723								
WG2373512-3 DUP		**L1815462-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	23-AUG-16
WG2373512-2 LCS								
Mercury (Hg)			102.0		%		70-130	23-AUG-16
WG2373512-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	23-AUG-16
WG2373512-4 MS		**L1815462-1**						
Mercury (Hg)			87.0		%		50-140	23-AUG-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3532524								
WG2373873-4 DUP		**WG2373873-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	24-AUG-16
WG2373873-2 LCS								
Zinc (Zn)-Total			90.9		%		70-130	24-AUG-16
WG2373873-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	24-AUG-16
WG2373873-5 MS		**WG2373873-3**						
Zinc (Zn)-Total			89.6		%		70-130	24-AUG-16
MET-TCLP-WT	**Waste**							

Quality Control Report

Workorder: L1815462 Report Date: 25-AUG-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3532524								
WG2373873-4 DUP		**WG2373873-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	24-AUG-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	24-AUG-16
Boron (B)		4.1	4.1		mg/L	0.4	40	24-AUG-16
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	40	24-AUG-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	24-AUG-16
Chromium (Cr)		2.29	2.28		mg/L	0.4	40	24-AUG-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	24-AUG-16
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	24-AUG-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	24-AUG-16
WG2373873-2 LCS								
Silver (Ag)			99.1		%		70-130	24-AUG-16
Arsenic (As)			94.6		%		70-130	24-AUG-16
Boron (B)			94.6		%		70-130	24-AUG-16
Barium (Ba)			96.7		%		70-130	24-AUG-16
Cadmium (Cd)			94.9		%		70-130	24-AUG-16
Chromium (Cr)			93.0		%		70-130	24-AUG-16
Lead (Pb)			95.9		%		70-130	24-AUG-16
Selenium (Se)			95.2		%		70-130	24-AUG-16
Uranium (U)			99.4		%		70-130	24-AUG-16
WG2373873-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	24-AUG-16
Arsenic (As)			<0.050		mg/L		0.05	24-AUG-16
Boron (B)			<2.5		mg/L		2.5	24-AUG-16
Barium (Ba)			<0.50		mg/L		0.5	24-AUG-16
Cadmium (Cd)			<0.0050		mg/L		0.005	24-AUG-16
Chromium (Cr)			<0.050		mg/L		0.05	24-AUG-16
Lead (Pb)			<0.050		mg/L		0.05	24-AUG-16
Selenium (Se)			<0.025		mg/L		0.025	24-AUG-16
Uranium (U)			<0.25		mg/L		0.25	24-AUG-16
WG2373873-5 MS		**WG2373873-3**						
Silver (Ag)			109.5		%		50-150	24-AUG-16
Arsenic (As)			94.6		%		50-150	24-AUG-16
Boron (B)			90.9		%		50-150	24-AUG-16
Barium (Ba)			93.6		%		50-150	24-AUG-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch **R3532524**								
WG2373873-5 **MS**		**WG2373873-3**						
Cadmium (Cd)			94.6		%		50-150	24-AUG-16
Chromium (Cr)			N/A	MS-B	%		-	24-AUG-16
Lead (Pb)			90.2		%		50-150	24-AUG-16
Selenium (Se)			93.9		%		50-150	24-AUG-16
Uranium (U)			93.2		%		50-150	24-AUG-16

Quality Control Report

Client:	Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3	
Contact:	Jim Millard	

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1815462-COFC

COC Number: 14 -

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Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax bimcore@alsglobal.com

Email 2 bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

R ☑ Regular (Standard TAT if received by 3 pm - business days)

P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT

E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT

E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To

Same as Report To ☑ Yes ☐ No

Copy of Invoice with Report ☐ Yes ☑ No

Company:

Contact:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com

Email 2

Project Information

ALS Quote #:	Q42455
Job #:	MILNE PORT
PO / AFE:	4500017476
LSD:	

Oil and Gas Required Fields (client use)

Approver ID: Cost Center:

GL Account: Routing Code:

Activity Code:

Location:

ALS Lab Work Order # (lab use only): Aug18C L1815462 of

ALS Contact: Wayne Smith — Sampler: Ezra Arreak

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn) -	Number of Containers
1	Composite 20	13-Aug-16		Soil	R	2
2	Composite 21	13-Aug-16		Soil	R	2
3	Composite 22	13-Aug-16		Soil	R	2
4	Composite 23	13-Aug-16		Soil	R	2
5	Composite 24	13-Aug-16		Soil	R	2
6	Composite 25	13-Aug-16		Soil	R	2

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ — SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☒ — Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C — FINAL COOLER TEMPERATURES °C: 21.6°C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ezra Arreak	Date: August 13,	Time: 17:00	Received by:	Date:	Time:	Received by: [signature]	Date: 18-Aug-16	Time: 10:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Baffinland Iron Mine's Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 06-OCT-16
Report Date: 13-OCT-16 12:48 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1839605

Project P.O. #: 4500017476
Job Reference: MP-ASH
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839605-1 COMPOSITE 26 Sampled By: CR on 24-SEP-16 @ 16:10 Matrix: SOIL							
Sample Preparation							
Initial pH	11.91		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	7.18		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	6.28		0.10	%	06-OCT-16	07-OCT-16	R3565978
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50		0.50	mg/L		13-OCT-16	R3569831
Boron (B)	5.1		2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	0.417		0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025		0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25		0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0		1.0	mg/L		13-OCT-16	R3569831
L1839605-2 COMPOSITE 27 Sampled By: CR on 24-SEP-16 @ 16:20 Matrix: SOIL							
Sample Preparation							
Initial pH	11.78	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	7.63	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	3.10		0.10	%	06-OCT-16	07-OCT-16	R3565978
TCLP Metals							
Arsenic (As)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50	LTIS	0.50	mg/L		13-OCT-16	R3569831
Boron (B)	5.8	LTIS	2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	0.740	LTIS	0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025	LTIS	0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25	LTIS	0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0	LTIS	1.0	mg/L		13-OCT-16	R3569831
L1839605-3 COMPOSITE 28 Sampled By: CR on 24-SEP-16 @ 16:30 Matrix: SOIL							
Sample Preparation							
Initial pH	11.73		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	10.04		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839605-3 COMPOSITE 28 Sampled By: CR on 24-SEP-16 @ 16:30 Matrix: SOIL							
Physical Tests							
% Moisture	<0.10		0.10	%	06-OCT-16	07-OCT-16	R3565978
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50		0.50	mg/L		13-OCT-16	R3569831
Boron (B)	3.0		2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	0.475		0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025		0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25		0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0		1.0	mg/L		13-OCT-16	R3569831
L1839605-4 COMPOSITE 29 Sampled By: CR on 24-SEP-16 @ 16:40 Matrix: SOIL							
Sample Preparation							
Initial pH	11.76	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	8.86	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	<0.10		0.10	%	06-OCT-16	07-OCT-16	R3565978
TCLP Metals							
Arsenic (As)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50	LTIS	0.50	mg/L		13-OCT-16	R3569831
Boron (B)	3.9	LTIS	2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	1.01	LTIS	0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025	LTIS	0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25	LTIS	0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0	LTIS	1.0	mg/L		13-OCT-16	R3569831
L1839605-5 COMPOSITE 30 Sampled By: CR on 24-SEP-16 @ 16:50 Matrix: SOIL							
Sample Preparation							
Initial pH	11.46		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	6.48		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	<0.10		0.10	%	06-OCT-16	07-OCT-16	R3565978
TCLP Metals							
Arsenic (As)	0.083		0.050	mg/L		13-OCT-16	R3569831

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839605-5 COMPOSITE 30 Sampled By: CR on 24-SEP-16 @ 16:50 Matrix: SOIL							
TCLP Metals							
Barium (Ba)	<0.50		0.50	mg/L		13-OCT-16	R3569831
Boron (B)	3.6		2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025		0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25		0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0		1.0	mg/L		13-OCT-16	R3569831
L1839605-6 MP-ASH-181 Sampled By: CR on 24-SEP-16 @ 14:32 Matrix: SOIL							
Sample Preparation							
Initial pH	12.17	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	6.20	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	1.15		0.10	%	06-OCT-16	07-OCT-16	R3565978
TCLP Metals							
Arsenic (As)	0.099	LTIS	0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50	LTIS	0.50	mg/L		13-OCT-16	R3569831
Boron (B)	5.8	LTIS	2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	0.0589	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	0.027	LTIS	0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25	LTIS	0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0	LTIS	1.0	mg/L		13-OCT-16	R3569831
L1839605-7 MP-ASH-182 Sampled By: CR on 24-SEP-16 @ 14:30 Matrix: SOIL							
Sample Preparation							
Initial pH	12.26	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	7.84	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	<0.10		0.10	%	06-OCT-16	07-OCT-16	R3565978
TCLP Metals							
Arsenic (As)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50	LTIS	0.50	mg/L		13-OCT-16	R3569831
Boron (B)	4.5	LTIS	2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839605-7 MP-ASH-182 Sampled By: CR on 24-SEP-16 @ 14:30 Matrix: SOIL							
TCLP Metals							
Chromium (Cr)	0.378	LTIS	0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025	LTIS	0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25	LTIS	0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0	LTIS	1.0	mg/L		13-OCT-16	R3569831
L1839605-8 MP-ASH-183 Sampled By: CR on 24-SEP-16 @ 14:35 Matrix: SOIL							
Sample Preparation							
Initial pH	12.00	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	9.56	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	<0.10		0.10	%	06-OCT-16	07-OCT-16	R3565978
TCLP Metals							
Arsenic (As)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50	LTIS	0.50	mg/L		13-OCT-16	R3569831
Boron (B)	4.5	LTIS	2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025	LTIS	0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25	LTIS	0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0	LTIS	1.0	mg/L		13-OCT-16	R3569831
L1839605-9 MP-ASH-184 Sampled By: CR on 24-SEP-16 @ 14:38 Matrix: SOIL							
Sample Preparation							
Initial pH	12.30		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	9.01		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	<0.10		0.10	%	06-OCT-16	07-OCT-16	R3565980
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50		0.50	mg/L		13-OCT-16	R3569831
Boron (B)	4.1		2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	4.83		0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839605-9 MP-ASH-184 Sampled By: CR on 24-SEP-16 @ 14:38 Matrix: SOIL							
TCLP Metals							
Selenium (Se)	<0.025		0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25		0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0		1.0	mg/L		13-OCT-16	R3569831
L1839605-10 MP-ASH-189 Sampled By: CR on 24-SEP-16 @ 14:40 Matrix: SOIL							
Sample Preparation							
Initial pH	11.83		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	8.26		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	<0.10		0.10	%	06-OCT-16	07-OCT-16	R3565980
TCLP Metals							
Arsenic (As)	0.079		0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	0.61		0.50	mg/L		13-OCT-16	R3569831
Boron (B)	4.6		2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	1.75		0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025		0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25		0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0		1.0	mg/L		13-OCT-16	R3569831
L1839605-11 MP-ASH-190 Sampled By: CR on 24-SEP-16 @ 14:42 Matrix: SOIL							
Sample Preparation							
Initial pH	11.91		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	6.38		0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	0.42		0.10	%	06-OCT-16	07-OCT-16	R3565980
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50		0.50	mg/L		13-OCT-16	R3569831
Boron (B)	5.3		2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	0.0111		0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050		0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025		0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050		0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25		0.25	mg/L		13-OCT-16	R3569831

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1839605-11 MP-ASH-190 Sampled By: CR on 24-SEP-16 @ 14:42 Matrix: SOIL							
TCLP Metals							
Zinc (Zn)-Total	9.1		1.0	mg/L		13-OCT-16	R3569831
L1839605-12 MP-ASH-191 Sampled By: CR on 24-SEP-16 @ 14:45 Matrix: SOIL							
Sample Preparation							
Initial pH	11.60	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	6.07	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	26.6		0.10	%	06-OCT-16	07-OCT-16	R3565980
TCLP Metals							
Arsenic (As)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50	LTIS	0.50	mg/L		13-OCT-16	R3569831
Boron (B)	3.2	LTIS	2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	22.3	LTIS	0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025	LTIS	0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25	LTIS	0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0	LTIS	1.0	mg/L		13-OCT-16	R3569831
L1839605-13 MP-ASH-192 Sampled By: CR on 24-SEP-16 @ 14:47 Matrix: SOIL							
Sample Preparation							
Initial pH	12.29	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Final pH	8.01	LTIS	0.10	pH units	11-OCT-16	11-OCT-16	R3569178
Physical Tests							
% Moisture	1.90		0.10	%	06-OCT-16	07-OCT-16	R3565980
TCLP Metals							
Arsenic (As)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Barium (Ba)	<0.50	LTIS	0.50	mg/L		13-OCT-16	R3569831
Boron (B)	3.0	LTIS	2.5	mg/L		13-OCT-16	R3569831
Cadmium (Cd)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Chromium (Cr)	4.86	LTIS	0.050	mg/L		13-OCT-16	R3569831
Lead (Pb)	<0.050	LTIS	0.050	mg/L		13-OCT-16	R3569831
Mercury (Hg)	<0.00010		0.00010	mg/L		13-OCT-16	R3570054
Selenium (Se)	<0.025	LTIS	0.025	mg/L		13-OCT-16	R3569831
Silver (Ag)	<0.0050	LTIS	0.0050	mg/L		13-OCT-16	R3569831
Uranium (U)	<0.25	LTIS	0.25	mg/L		13-OCT-16	R3569831
Zinc (Zn)-Total	<1.0	LTIS	1.0	mg/L		13-OCT-16	R3569831

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
LTIS	Limited sample was available for TCLP inorganics and semi-volatiles extraction (< 100 grams). Extraction fluid volume and/or other elements of the TCLP method were scaled down proportionately to permit analysis. Test results from modified TCLP procedures may be unsuitable for regulatory purposes.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3565978								
WG2404886-3 DUP		**L1838508-2**						
% Moisture		33.0	33.2		%	0.4	20	07-OCT-16
WG2404886-2 LCS								
% Moisture			102.6		%		90-110	07-OCT-16
WG2404886-1 MB								
% Moisture			<0.10		%		0.1	07-OCT-16
Batch R3565980								
WG2405005-3 DUP		**L1838934-13**						
% Moisture		5.67	5.54		%	2.3	20	07-OCT-16
WG2405005-2 LCS								
% Moisture			103.8		%		90-110	07-OCT-16
WG2405005-1 MB								
% Moisture			<0.10		%		0.1	07-OCT-16
HG-TCLP-WT	**Waste**							
Batch R3570054								
WG2409503-3 DUP		**L1839605-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	13-OCT-16
WG2409503-2 LCS								
Mercury (Hg)			104.0		%		70-130	13-OCT-16
WG2409503-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	13-OCT-16
WG2409503-4 MS		**L1839612-1**						
Mercury (Hg)			96.3		%		50-140	13-OCT-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3569831								
WG2408843-4 DUP		**WG2408843-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	13-OCT-16
WG2408843-2 LCS								
Zinc (Zn)-Total			91.8		%		70-130	13-OCT-16
WG2408843-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	13-OCT-16
WG2408843-5 MS		**WG2408843-3**						
Zinc (Zn)-Total			93.6		%		70-130	13-OCT-16
MET-TCLP-WT	**Waste**							

Quality Control Report

Workorder: L1839605   Report Date: 13-OCT-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3569831								
WG2408843-4 DUP		**WG2408843-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	13-OCT-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	13-OCT-16
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	13-OCT-16
Barium (Ba)		0.51	0.53		mg/L	2.7	40	13-OCT-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	13-OCT-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	13-OCT-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	13-OCT-16
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	13-OCT-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	13-OCT-16
WG2408843-2 LCS								
Silver (Ag)			95.1		%		70-130	13-OCT-16
Arsenic (As)			96.0		%		70-130	13-OCT-16
Boron (B)			97.7		%		70-130	13-OCT-16
Barium (Ba)			99.4		%		70-130	13-OCT-16
Cadmium (Cd)			97.1		%		70-130	13-OCT-16
Chromium (Cr)			96.0		%		70-130	13-OCT-16
Lead (Pb)			97.7		%		70-130	13-OCT-16
Selenium (Se)			93.0		%		70-130	13-OCT-16
Uranium (U)			95.7		%		70-130	13-OCT-16
WG2408843-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	13-OCT-16
Arsenic (As)			<0.050		mg/L		0.05	13-OCT-16
Boron (B)			<2.5		mg/L		2.5	13-OCT-16
Barium (Ba)			<0.50		mg/L		0.5	13-OCT-16
Cadmium (Cd)			<0.0050		mg/L		0.005	13-OCT-16
Chromium (Cr)			<0.050		mg/L		0.05	13-OCT-16
Lead (Pb)			<0.050		mg/L		0.05	13-OCT-16
Selenium (Se)			<0.025		mg/L		0.025	13-OCT-16
Uranium (U)			<0.25		mg/L		0.25	13-OCT-16
WG2408843-5 MS		**WG2408843-3**						
Silver (Ag)			109.2		%		50-150	13-OCT-16
Arsenic (As)			99.3		%		50-150	13-OCT-16
Boron (B)			132.3		%		50-150	13-OCT-16
Barium (Ba)			110.5		%		50-150	13-OCT-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3569831								
WG2408843-5 MS		**WG2408843-3**						
Cadmium (Cd)			101.2		%		50-150	13-OCT-16
Chromium (Cr)			140.0		%		50-150	13-OCT-16
Lead (Pb)			92.8		%		50-150	13-OCT-16
Selenium (Se)			96.3		%		50-150	13-OCT-16
Uranium (U)			91.6		%		50-150	13-OCT-16

Quality Control Report

Workorder: L1839605 Report Date: 13-OCT-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1839605-COFC

COC Number: 14 -

Page 1 of 2

Report To		Report Format / Distribution	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Contact:	Jim Millard	Quality Control (QC) Report with Report	☑ Yes ☐ No
Address:	2275 Upper Middle Rd. E., Suite #300	☑ Criteria on Report - provide details below if box checked	
	Oakville, ON, L6H 0C3	Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Phone:	647-253-0596 EXT 6010	Email 1 or Fax	bimcore@alsglobal.com
		Email 2	bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To		Invoice Distribution	
Same as Report To	☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Copy of Invoice with Report	☐ Yes ☑ No	Email 1 or Fax	ap@baffinland.com
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MP-ASH	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	L1839605 GA	ALS Contact: Wayne Smith	Sampler: CR

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn)	Number of Containers
1	Composite 26	24-Sep-16	16:10	Soil	R	1
2	Composite 27	24-Sep-16	16:20	Soil	R	1
3	Composite 28	24-Sep-16	16:30	Soil	R	1
4	Composite 29	24-Sep-16	16:40	Soil	R	1
5	Composite 30	24-Sep-16	16:50	Soil	R	1
6	MP-ASH-181	24-Sep-16	14:32	Soil	R	1
7	MP-ASH-182	24-Sep-16	14:30	Soil	R	1
8	MP-ASH-183	24-Sep-16	14:35	Soil	R	1
9	MP-ASH-184	24-Sep-16	14:38	Soil	R	1
10	MP-ASH-189	24-Sep-16	14:40	Soil	R	1
11	MP-ASH-190	24-Sep-16	14:42	Soil	R	1
12	MP-ASH-191	24-Sep-16	14:45	Soil	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C: 4.5

FINAL COOLER TEMPERATURES °C: 15.0

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katie Babin	Date: 16 10 02	Time: 18:00	Received by: [signature]	Date: 10/3/16	Time: 06:30	Received by: DM	Date: 6 Oct 16	Time: 1000

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L1839605-COFC

COC Number: 14 -

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax bimcore@alsglobal.com

Email 2 bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	
Same as Report To	☑ Yes ☐ No
Copy of Invoice with Report	☐ Yes ☑ No
Company:	
Contact:	

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com

Email 2

Project Information

ALS Quote #:	Q42455
Job #:	MP-ASH
PO / AFE:	4500017476
LSD:	

Oil and Gas Required Fields (client use)

Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only)

ALS Contact: Wayne Smith

Sampler: CR

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn) -	Number of Containers
13	MP-ASH-192	24-Sep-16	14:47	Soil	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION   WHITE - LABORATORY COPY   YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Baffinland Iron Mine's Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 20-OCT-16
Report Date: 26-OCT-16 11:35 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1845978

Project P.O. #: 4500017467
Job Reference: MILNE PORT
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1845978-1 MP-ASH-193 Sampled By: CD/EA on 11-OCT-16 @ 19:00 Matrix: SOIL							
Sample Preparation							
Initial pH	11.68		0.10	pH units	20-OCT-16	20-OCT-16	R3577753
Final pH	12.08		0.10	pH units	20-OCT-16	20-OCT-16	R3577753
Physical Tests							
% Moisture	<0.10		0.10	%	20-OCT-16	21-OCT-16	R3576160
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		24-OCT-16	R3578290
Barium (Ba)	0.85		0.50	mg/L		24-OCT-16	R3578290
Boron (B)	<2.5		2.5	mg/L		24-OCT-16	R3578290
Cadmium (Cd)	<0.0050		0.0050	mg/L		24-OCT-16	R3578290
Chromium (Cr)	1.40		0.050	mg/L		24-OCT-16	R3578290
Lead (Pb)	<0.050		0.050	mg/L		24-OCT-16	R3578290
Mercury (Hg)	<0.00010		0.00010	mg/L		24-OCT-16	R3578264
Selenium (Se)	<0.025		0.025	mg/L		24-OCT-16	R3578290
Silver (Ag)	<0.0050		0.0050	mg/L		24-OCT-16	R3578290
Uranium (U)	<0.25		0.25	mg/L		24-OCT-16	R3578290
Zinc (Zn)-Total	<1.0		1.0	mg/L		24-OCT-16	R3578290

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chromium (Cr)	MS-B	L1845978-1

Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1845978 Report Date: 26-OCT-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3576160								
WG2414802-4 DUP		**L1845407-1**						
% Moisture		16.3	16.4		%	1.0	20	21-OCT-16
WG2414802-2 LCS								
% Moisture			102.7		%		90-110	21-OCT-16
WG2414802-1 MB								
% Moisture			<0.10		%		0.1	21-OCT-16
HG-TCLP-WT	**Waste**							
Batch R3578264								
WG2417216-3 DUP		**L1846593-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	24-OCT-16
WG2417216-2 LCS								
Mercury (Hg)			102.0		%		70-130	24-OCT-16
WG2417216-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	24-OCT-16
WG2417216-4 MS		**L1846813-1**						
Mercury (Hg)			89.0		%		50-140	24-OCT-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3578290								
WG2417021-4 DUP		**WG2417021-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	24-OCT-16
WG2417021-2 LCS								
Zinc (Zn)-Total			92.6		%		70-130	24-OCT-16
WG2417021-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	24-OCT-16
WG2417021-5 MS		**WG2417021-3**						
Zinc (Zn)-Total			99.7		%		70-130	24-OCT-16
MET-TCLP-WT	**Waste**							
Batch R3578290								
WG2417021-4 DUP		**WG2417021-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	24-OCT-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	24-OCT-16
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	24-OCT-16
Barium (Ba)		0.85	0.89		mg/L	4.0	40	24-OCT-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	24-OCT-16
Chromium (Cr)		1.40	1.50		mg/L	6.9	40	24-OCT-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	24-OCT-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3578290								
WG2417021-4 DUP		**WG2417021-3**						
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	24-OCT-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	24-OCT-16
WG2417021-2 LCS								
Silver (Ag)			96.2		%		70-130	24-OCT-16
Arsenic (As)			98.8		%		70-130	24-OCT-16
Boron (B)			92.3		%		70-130	24-OCT-16
Barium (Ba)			101.6		%		70-130	24-OCT-16
Cadmium (Cd)			103.7		%		70-130	24-OCT-16
Chromium (Cr)			98.0		%		70-130	24-OCT-16
Lead (Pb)			100.2		%		70-130	24-OCT-16
Selenium (Se)			96.3		%		70-130	24-OCT-16
Uranium (U)			102.3		%		70-130	24-OCT-16
WG2417021-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	24-OCT-16
Arsenic (As)			<0.050		mg/L		0.05	24-OCT-16
Boron (B)			<2.5		mg/L		2.5	24-OCT-16
Barium (Ba)			<0.50		mg/L		0.5	24-OCT-16
Cadmium (Cd)			<0.0050		mg/L		0.005	24-OCT-16
Chromium (Cr)			<0.050		mg/L		0.05	24-OCT-16
Lead (Pb)			<0.050		mg/L		0.05	24-OCT-16
Selenium (Se)			<0.025		mg/L		0.025	24-OCT-16
Uranium (U)			<0.25		mg/L		0.25	24-OCT-16
WG2417021-5 MS		**WG2417021-3**						
Silver (Ag)			104.0		%		50-150	24-OCT-16
Arsenic (As)			105.2		%		50-150	24-OCT-16
Boron (B)			114.5		%		50-150	24-OCT-16
Barium (Ba)			108.4		%		50-150	24-OCT-16
Cadmium (Cd)			107.4		%		50-150	24-OCT-16
Chromium (Cr)			N/A	MS-B	%		-	24-OCT-16
Lead (Pb)			91.1		%		50-150	24-OCT-16
Selenium (Se)			98.0		%		50-150	24-OCT-16
Uranium (U)			98.3		%		50-150	24-OCT-16

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1845978-COFC

COC Number: 14 -

Page 1 of 1

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: bimcore@alsglobal.com

Email 2: bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To

Same as Report To ☑ Yes ☐ No

Copy of Invoice with Report ☐ Yes ☑ No

Company:

Contact:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: ap@baffinland.com

Email 2:

Project Information

ALS Quote #:	Q42455
Job #:	MILNE PORT
PO / AFE:	4500017467
LSD:	

Oil and Gas Required Fields (client use)

Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only): L1845978

ALS Contact: Wayne Smith

Sampler: CD/EA

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn) -	Number of Containers
1	MP-ASH-193	11-10-2016	19:00	Soil	R	2

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C: 17.6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ezra Arreak	Date: 11/10/2016	Time: 20:53	Received by:	Date:	Time:	Received by:	Date: 2016 Oct 16	Time: 1000

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Baffinland Iron Mine's Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 10-NOV-16
Report Date: 17-NOV-16 14:29 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1856192

Project P.O. #: 4500017476
Job Reference: MP-ASH
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1856192-1 MP-ASH-194-1 Sampled By: KB/BP on 30-OCT-16 @ 11:30 Matrix: SOIL							
Sample Preparation							
Initial pH	12.55		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Final pH	9.07		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Physical Tests							
% Moisture	1.25		0.10	%	10-NOV-16	11-NOV-16	R3592842
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Barium (Ba)	<0.50		0.50	mg/L		17-NOV-16	R3596850
Boron (B)	3.5		2.5	mg/L		17-NOV-16	R3596850
Cadmium (Cd)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Chromium (Cr)	0.770		0.050	mg/L		17-NOV-16	R3596850
Lead (Pb)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Mercury (Hg)	<0.00010		0.00010	mg/L		17-NOV-16	R3597017
Selenium (Se)	<0.025		0.025	mg/L		17-NOV-16	R3596850
Silver (Ag)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Uranium (U)	<0.25		0.25	mg/L		17-NOV-16	R3596850
Zinc (Zn)-Total	<1.0		1.0	mg/L		17-NOV-16	R3596850
L1856192-2 MP-ASH-194-2 Sampled By: KB/BP on 30-OCT-16 @ 11:35 Matrix: SOIL							
Sample Preparation							
Initial pH	12.29		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Final pH	8.62		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Physical Tests							
% Moisture	4.02		0.10	%	10-NOV-16	11-NOV-16	R3592842
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Barium (Ba)	<0.50		0.50	mg/L		17-NOV-16	R3596850
Boron (B)	4.0		2.5	mg/L		17-NOV-16	R3596850
Cadmium (Cd)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Chromium (Cr)	0.800		0.050	mg/L		17-NOV-16	R3596850
Lead (Pb)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Mercury (Hg)	<0.00010		0.00010	mg/L		17-NOV-16	R3597017
Selenium (Se)	<0.025		0.025	mg/L		17-NOV-16	R3596850
Silver (Ag)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Uranium (U)	<0.25		0.25	mg/L		17-NOV-16	R3596850
Zinc (Zn)-Total	<1.0		1.0	mg/L		17-NOV-16	R3596850
L1856192-3 MP-ASH-194-3 Sampled By: KB/BP on 30-OCT-16 @ 11:40 Matrix: SOIL							
Sample Preparation							
Initial pH	12.25		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Final pH	8.26		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1856192-3 MP-ASH-194-3 Sampled By: KB/BP on 30-OCT-16 @ 11:40 Matrix: SOIL							
Physical Tests							
% Moisture	1.04		0.10	%	10-NOV-16	11-NOV-16	R3592842
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Barium (Ba)	<0.50		0.50	mg/L		17-NOV-16	R3596850
Boron (B)	4.1		2.5	mg/L		17-NOV-16	R3596850
Cadmium (Cd)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Chromium (Cr)	1.58		0.050	mg/L		17-NOV-16	R3596850
Lead (Pb)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Mercury (Hg)	<0.00010		0.00010	mg/L		17-NOV-16	R3597017
Selenium (Se)	<0.025		0.025	mg/L		17-NOV-16	R3596850
Silver (Ag)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Uranium (U)	<0.25		0.25	mg/L		17-NOV-16	R3596850
Zinc (Zn)-Total	<1.0		1.0	mg/L		17-NOV-16	R3596850
L1856192-4 MP-ASH-194-4 Sampled By: KB/BP on 30-OCT-16 @ 11:45 Matrix: SOIL							
Sample Preparation							
Initial pH	12.50		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Final pH	8.49		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Physical Tests							
% Moisture	0.94		0.10	%	10-NOV-16	11-NOV-16	R3592842
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Barium (Ba)	<0.50		0.50	mg/L		17-NOV-16	R3596850
Boron (B)	3.6		2.5	mg/L		17-NOV-16	R3596850
Cadmium (Cd)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Chromium (Cr)	0.680		0.050	mg/L		17-NOV-16	R3596850
Lead (Pb)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Mercury (Hg)	<0.00010		0.00010	mg/L		17-NOV-16	R3597017
Selenium (Se)	<0.025		0.025	mg/L		17-NOV-16	R3596850
Silver (Ag)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Uranium (U)	<0.25		0.25	mg/L		17-NOV-16	R3596850
Zinc (Zn)-Total	<1.0		1.0	mg/L		17-NOV-16	R3596850
L1856192-5 MP-ASH-194-5 Sampled By: KB/BP on 30-OCT-16 @ 11:50 Matrix: SOIL							
Sample Preparation							
Initial pH	12.24		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Final pH	7.50		0.10	pH units	15-NOV-16	15-NOV-16	R3597171
Physical Tests							
% Moisture	5.67		0.10	%	10-NOV-16	11-NOV-16	R3592842
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		17-NOV-16	R3596850

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1856192-5 MP-ASH-194-5							
Sampled By: KB/BP on 30-OCT-16 @ 11:50							
Matrix: SOIL							
TCLP Metals							
Barium (Ba)	<0.50		0.50	mg/L		17-NOV-16	R3596850
Boron (B)	4.0		2.5	mg/L		17-NOV-16	R3596850
Cadmium (Cd)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Chromium (Cr)	0.070		0.050	mg/L		17-NOV-16	R3596850
Lead (Pb)	<0.050		0.050	mg/L		17-NOV-16	R3596850
Mercury (Hg)	<0.00010		0.00010	mg/L		17-NOV-16	R3597017
Selenium (Se)	<0.025		0.025	mg/L		17-NOV-16	R3596850
Silver (Ag)	<0.0050		0.0050	mg/L		17-NOV-16	R3596850
Uranium (U)	<0.25		0.25	mg/L		17-NOV-16	R3596850
Zinc (Zn)-Total	<1.0		1.0	mg/L		17-NOV-16	R3596850

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311
Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).			
MET-TCLP-EXTRA-WT	Waste	O. Reg 347 Extra Metals on TCLP Leachate	EPA 200.8
MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3592842								
WG2430503-3 DUP		**L1855610-3**						
% Moisture		11.7	12.0		%	2.1	20	11-NOV-16
WG2430503-2 LCS								
% Moisture			94.7		%		90-110	11-NOV-16
WG2430503-1 MB								
% Moisture			<0.10		%		0.1	11-NOV-16
HG-TCLP-WT	**Waste**							
Batch R3597017								
WG2433939-3 DUP		**L1857249-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	17-NOV-16
WG2433939-2 LCS								
Mercury (Hg)			100.0		%		70-130	17-NOV-16
WG2433939-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	17-NOV-16
WG2433939-4 MS		**L1857414-2**						
Mercury (Hg)			96.7		%		50-140	17-NOV-16
MET-TCLP-EXTRA-WT	**Waste**							
Batch R3596850								
WG2434325-4 DUP		**WG2434325-3**						
Zinc (Zn)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	30	17-NOV-16
WG2434325-2 LCS								
Zinc (Zn)-Total			91.1		%		70-130	17-NOV-16
WG2434325-1 MB								
Zinc (Zn)-Total			<1.0		mg/L		1	17-NOV-16
WG2434325-5 MS		**WG2434325-3**						
Zinc (Zn)-Total			90.6		%		70-130	17-NOV-16
MET-TCLP-WT	**Waste**							
Batch R3596850								
WG2434325-4 DUP		**WG2434325-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	17-NOV-16
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	17-NOV-16
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	17-NOV-16
Barium (Ba)		0.61	0.59		mg/L	2.6	40	17-NOV-16
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	17-NOV-16
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	17-NOV-16
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	17-NOV-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3596850								
WG2434325-4 DUP		**WG2434325-3**						
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	17-NOV-16
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	17-NOV-16
WG2434325-2 LCS								
Silver (Ag)			99.2		%		70-130	17-NOV-16
Arsenic (As)			98.5		%		70-130	17-NOV-16
Boron (B)			100.2		%		70-130	17-NOV-16
Barium (Ba)			97.5		%		70-130	17-NOV-16
Cadmium (Cd)			100.3		%		70-130	17-NOV-16
Chromium (Cr)			98.4		%		70-130	17-NOV-16
Lead (Pb)			103.8		%		70-130	17-NOV-16
Selenium (Se)			98.2		%		70-130	17-NOV-16
Uranium (U)			104.0		%		70-130	17-NOV-16
WG2434325-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	17-NOV-16
Arsenic (As)			<0.050		mg/L		0.05	17-NOV-16
Boron (B)			<2.5		mg/L		2.5	17-NOV-16
Barium (Ba)			<0.50		mg/L		0.5	17-NOV-16
Cadmium (Cd)			<0.0050		mg/L		0.005	17-NOV-16
Chromium (Cr)			<0.050		mg/L		0.05	17-NOV-16
Lead (Pb)			<0.050		mg/L		0.05	17-NOV-16
Selenium (Se)			<0.025		mg/L		0.025	17-NOV-16
Uranium (U)			<0.25		mg/L		0.25	17-NOV-16
WG2434325-5 MS		**WG2434325-3**						
Silver (Ag)			119.6		%		50-150	17-NOV-16
Arsenic (As)			94.6		%		50-150	17-NOV-16
Boron (B)			101.1		%		50-150	17-NOV-16
Barium (Ba)			95.2		%		50-150	17-NOV-16
Cadmium (Cd)			91.5		%		50-150	17-NOV-16
Chromium (Cr)			92.7		%		50-150	17-NOV-16
Lead (Pb)			94.4		%		50-150	17-NOV-16
Selenium (Se)			96.1		%		50-150	17-NOV-16
Uranium (U)			97.1		%		50-150	17-NOV-16

Quality Control Report

Workorder: L1856192 Report Date: 17-NOV-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1856192-COFC

COC Number: 14 -

Page 1 of 2

Report To	
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642
Contact:	Jim Millard
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3
Phone:	647-253-0596 EXT 6010

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: bimcore@alsglobal.com

Email 2: bimww@alsglobal.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	
Same as Report To	☑ Yes ☐ No
Copy of Invoice with Report	☐ Yes ☑ No
Company:	
Contact:	

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: ap@baffinland.com

Email 2:

Project Information	
ALS Quote #:	Q42455
Job #:	MP-ASH
PO / AFE:	4500017476
LSD:	
ALS Lab Work Order # (lab use only)	L1856192

Oil and Gas Required Fields (client use)

Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Contact: Wayne Smith   Sampler: KB/BP

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-TCLP-MET1-WT (TCLP Hg,Ag,As,Ba,Cd,Cr,Pb,Se,Zn) -	Number of Containers
1	MP-ASH-194-1	30-Oct-16	11:30	Soil	R	1
2	MP-ASH-194-2	30-Oct-16	11:35	Soil	R	1
3	MP-ASH-194-3	30-Oct-16	11:40	Soil	R	1
4	MP-ASH-194-4	30-Oct-16	11:45	Soil	R	1
5	MP-ASH-194-5	30-Oct-16	11:50	Soil	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C: 14.1

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katie Babin	Date: 16 10 30	Time: 18:00	Received by:	Date:	Time:	Received by: [illegible]	Date: 1 Nov 16	Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION   WHITE - LABORATORY COPY   YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

pm

APPENDIX D.3

STREAMFLOW DATA FOR TYPE A WATER LICENCE MONITORING LOCATIONS

STORY environmental inc

MEMO

To:	Andrew Vermeer Regulatory Reporting Specialist Baffinland Iron Mines	**From:**	Andrew Rees, Ph.D., EP Senior Environmental Scientist
Re:	2016 Hydrometric Monitoring Program at Water License Sites	**Date:**	20 March 2017
		Proj No:	199-03-09

1 Introduction

A monitoring requirement of the Type A Water Licence #2AM-MRY1325 issued to Baffinland Iron Mines Corporation (Baffinland) for the Mary River Project is to measure the flow and the water quality of surface discharge at locations established as part of the Surveillance Network Program (SNP). Hydrometric monitoring at or near nine of the SNP stations was initiated in 2014. The SNP Station names, types, and data collected are summarized in Table 1.1.

Table 1.1 SNP Hydrometric Stations

SNP Station	Hydrometric Station Type	Data Collected
MQ-C-B MQ-C-D MS-C-A/B	Hydrometric station installed using natural channel control	Discharge and water level were measured during weekly sampling events to validate stage-discharge relationships. Water level data loggers were downloaded monthly.
MP-Q1-01 MP-Q1-02 MP-C-B MS-MRY-13a MQ-C-A MS-C-E	Hydrometric station installed using thin plate V-notch weir flow measurement structures	Water level measured weekly. Water level data loggers downloaded monthly.

2 Measurement of Discharge

Site visits were made to the SNP hydrometric stations in June, July, and August 2016. An initial site visit was conducted in June 2016 to re-install the water level data loggers, measure flow, and perform maintenance where required. The weir boxes were removed and re-installed at MP-Q1-01 and MP-Q1-02 to address the accumulation of sediment and leakage. Additional site visits were made in July and August to measure flow.

3 Daily Discharge Data

Water level data were recorded at each site on 15 minute intervals and daily discharge was calculated by averaging the 15 minute data on a daily basis.

The daily discharge data recorded at all SNP Stations for June and July are shown in Table 3.1 and for August and September in Table 3.2.

Prepared by: Andrew Rees, Ph.D., EP
Senior Environmental Scientist

Reviewed by: Maria Story, P.Eng.
President

Attachments:

Table 3.1	SNP Station Daily Average Discharge – June and July
Table 3.2	SNP Station Daily Average Discharge – August and September

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 Water License Site Hydrology\BIM 2016 Water Lic Sites Summary_Final.docx

Attachments

Table 3.1 - SNP Station Daily Average Discharge - June and July

Date	Daily Average Discharge (l/s)								
	MP-C-B	MP-Q1-01	MP-Q1-02	MQ-C-A	MQ-C-B	MQ-C-D	MRY-13a	MS-C-AB	MS-C-E
23-Jun-16				3.98	10.6		0.006		
24-Jun-16				0.96	10.1		0.013		
25-Jun-16		1.1	2.2	1.58	7.4		0.015		
26-Jun-16		1.2	1.9	1.29	6.1		0.014		
27-Jun-16		1.3	1.8	1.72	4.8	17.9	0.018	4.7	0.6
28-Jun-16	4.7	1.5	1.8	1.74	4.7	10.8	0.010	4.7	0.5
29-Jun-16	4.6	1.3	1.6	0.84	4.7	6.3	0.011	4.4	0.4
30-Jun-16	4.5	1.1	1.5	0.76	4.1	7.7	0.036	4.4	0.5
1-Jul-16	3.9	0.9	1.4	0.52	4.0	4.7	0.014	4.1	0.5
2-Jul-16	2.8	0.7	1.2	0.22	3.8	1.6	0.001	3.8	0.5
3-Jul-16	2.3	0.6	1.0	0.16	3.3	1.9	0.002	3.0	0.6
4-Jul-16	2.0	0.5	0.9	0.12	2.9	2.9	0	2.7	0.7
5-Jul-16	1.9	0.4	0.8	0.10	2.4	3.5	0	2.6	0.7
6-Jul-16	1.5	0.4	0.8	0.05	2.0	1.9	0	3.0	0.5
7-Jul-16	1.1	0.5	0.7	0.03	1.9	2.7	0	3.2	0.6
8-Jul-16	1.0	0.5	0.7	0.01	1.8	2.4	0	3.5	0.7
9-Jul-16	0.9	0.6	0.6	0.004	1.8	2.7	0	3.7	0.8
10-Jul-16	0.8	0.6	0.6	0	1.7	0.9	0	3.8	0.8
11-Jul-16	2.6	0.9	0.8	0.001	1.9	0.2	0	4.9	1.3
12-Jul-16	3.9	1.1	1.3	0.16	5.0	2.8	0.009	7.9	3.4
13-Jul-16	2.7	1.1	0.9	0.05	4.3	6.9	0	9.4	3.6
14-Jul-16	2.2	0.9	0.6	0.003	3.7	3.9	0	8.3	2.8
15-Jul-16	1.7	0.8	0.6	0.01	4.4	0.5	0	8.3	2.7
16-Jul-16	1.2	0.6	0.5	0.01	5.1	1.0	0	8.6	2.4
17-Jul-16	0.9	0.5	0.4	0	1.6	0.6	0	7.2	1.2
18-Jul-16	0.7	0.4	0.4	0	2.3	0.1	0	6.7	1.4
19-Jul-16	0.5	0.3	0.3	0.01	3.6	0.03	0	7.3	1.8
20-Jul-16	0.7	0.2	0.3	0.01	4.0	0.8	0	7.4	1.8
21-Jul-16	1.0	0.3	0.3	0.07	5.6	3.6	0	8.3	2.4
22-Jul-16	1.0	0.2	0.2	0.01	3.8	4.9	0	7.9	1.9
23-Jul-16	0.9	0.1	0.2	0.002	3.7	3.2	0	7.3	1.6
24-Jul-16	1.0	0.1	0.2	0.08	5.9	3.3	0	7.9	2.0
25-Jul-16	1.2	0.1	0.2	0.45	9.5	5.1	0	11.0	3.0
26-Jul-16	1.1	0.1	0.1	0.37	9.7	6.9	0	12.6	2.9
27-Jul-16	0.9	0.1	0.1	0.11	6.6	8.6	0	13.2	2.3
28-Jul-16	0.7	0.1	0.1	0.07	6.2	6.0	0	14.5	2.1
29-Jul-16	0.8	0.1	0.1	0.09	6.2	5.5	0	15.4	2.1
30-Jul-16	0.8	0.1	0.1	0.13	7.1	6.7	0	15.9	2.1
31-Jul-16	0.9	0.1	0.1	0.21	7.9	5.6	0	15.6	2.1

Table 3.2 - SNP Station Daily Average Discharge - August and September

Date	Daily Average Discharge (l/s)								
	MP-C-B	MP-Q1-01	MP-Q1-02	MQ-C-A	MQ-C-B	MQ-C-D	MRY-13a	MS-C-AB	MS-C-E
1-Aug-16	3.1	0.2	0.26	4.3	36.5	27.2	0.04	32.7	6.2
2-Aug-16	4.7	0.4	0.36	7.8	66.5	71.0	0.15	106.3	18.7
3-Aug-16	5.2	1.2	0.43	4.5	56.7	71.7	0.09	168.9	18.9
4-Aug-16	16.8	5.3	1.17	10.0	80.3	80.2	0.28	147.4	22.0
5-Aug-16	20.5	5.9	1.33	7.3	77.0	97.5	0.20	193.4	14.6
6-Aug-16	14.1	4.1	1.28	3.2	49.6	65.0	0.10	124.3	15.6
7-Aug-16	10.4	3.4	1.17	2.1	38.2	50.2	0.06	94.1	10.2
8-Aug-16	8.2	3.1	1.03	1.6	31.5	45.6	0.03	77.4	8.5
9-Aug-16	7.6	2.3	0.87	1.2	25.2	36.1	0	64.4	7.1
10-Aug-16	8.5	1.8	0.71	0.9	21.4	29.5	0	53.8	6.0
11-Aug-16	5.5	1.5	0.60	0.7	17.8	23.7	0	45.2	5.0
12-Aug-16	12.6	1.3	0.49	0.6	15.9	18.9	0	38.8	4.2
13-Aug-16	13.9	1.0	0.39	0.6	15.0	19.1	0	34.3	3.8
14-Aug-16	5.9	0.6	0.30	0.5	13.2	13.9	0	30.1	3.2
15-Aug-16	5.0	0.5	0.24	0.5	12.7	12.5	0	26.3	2.9
16-Aug-16	4.0	0.5	0.19	0.6	13.7	12.1	0	24.1	2.6
17-Aug-16	3.6	0.4	0.16	1.1	19.0	18.8	0	24.4	3.0
18-Aug-16	3.2	0.3	0.12	1.0	17.1	18.4	0	23.5	2.5
19-Aug-16	2.3	0.2	0.09	0.6	14.0	9.1	0	20.2	1.9
20-Aug-16	2.1	0.2	0.08	0.5	13.0	8.5	0	17.9	1.6
21-Aug-16	2.0	0.2	0.07	0.5	12.1	10.5	0	16.2	1.4
22-Aug-16	1.9	0.2	0.07	0.5	12.0	11.4	0	14.9	1.2
23-Aug-16	1.4	0.1	0.07	0.3	8.9	5.9	0	13.5	0.9
24-Aug-16	1.2	0.1	0.06	0.4	9.8	4.1	0	12.8	0.8
25-Aug-16	1.6	0.1	0.07	0.5	11.6	8.3	0	12.9	0.9
26-Aug-16	1.6	0.1	0.06	0.4	8.9	4.8	0	12.1	0.6
27-Aug-16	1.3	0.1	0.05	0.4	9.3	5.6	0	11.6	0.6
28-Aug-16	1.2	0.1	0.05	0.4	9.7	6.5	0	11.0	0.6
29-Aug-16	1.3	0.0	0.05	0.4	9.4	6.8	0	10.5	0.5
30-Aug-16	1.2	0.0	0.04	0.4	9.4	3.8	0	9.9	0.4
31-Aug-16	0.9	0.1	0.14	0.3	9.1	0.7	0	9.2	0.3
1-Sep-16	0.7		0.03	0.3	9.3	0.4	0	8.4	0.3
2-Sep-16	0.7		0.03	0.4	10.4	0.7	0	7.9	0.3
3-Sep-16				0.4	10.8	0.7	0	7.4	0.3

APPENDIX D.4

SHIPPING MANIFESTS (INBOUND AND OUTBOUND)

INBOUND SHIPPING MANIFESTS

VALPORT
Les services maritimes inc.
Maritime Services Inc.

MANIFESTE DE NAVIRE - VESSEL MANIFEST

SOMMAIRE PAR EMPLACEMENT / LOCATION SUMMARY — **NAVIRE / VESSEL :Rosaire Voy: 1** — DATE: 5-Aug-16

DESTINATION: PORT				DESTINATION: MINE			
EMPLACEMENT LOCATION	QUANTITÉ QUANTITY	VOLUME (M³)	POIDS WEIGHT (MT)	EMPLACEMENT LOCATION	QUANTITÉ QUANTITY	VOLUME (M³)	POIDS WEIGHT (MT)
DECK 1	0	0.00	0.00	DECK 1	31	1382.25	630.33
DECK 2	6	269.85	59.71	DECK 2	25	550.29	181.32
DECK 3	23	1513.29	275.81	DECK 3	29	1194.17	254.15
DECK 4	8	308.40	61.60	DECK 4	18	693.90	151.45
DECK TOTAL	37	2091.54	397.11	**DECK TOTAL**	103	3820.61	1217.24
TWEEN DECK 1	51	212.96	71.90	TWEEN DECK 1	80	609.16	271.67
TWEEN DECK 2	0	0.00	0.00	TWEEN DECK 2	23	2257.76	412.53
TWEEN DECK 3	2	10.35	1.81	TWEEN DECK 3	20	1825.61	413.02
TWEEN DECK 4	0	0.00	0.00	TWEEN DECK 4	0	0.00	0.00
TWEEN TOTAL	53	223.31	73.71	**TWEEN TOTAL**	123	4692.53	1097.22
LOWER HOLD 1	14	539.70	163.43	LOWER HOLD 1	18	693.90	188.82
LOWER HOLD 2	43	983.83	294.17	LOWER HOLD 2	19	648.29	229.27
LOWER HOLD 3	0	0.00	0.00	LOWER HOLD 3	0	0.00	0.00
LOWER HOLD 4	0	0.00	0.00	LOWER HOLD 4	0	0.00	0.00
LOWER HOLD TOTAL	57	1523.53	457.60	**LOWER HOLD TOTAL**	37	1342.19	418.10
TOTAL	147	3838.38	928.42	**TOTAL**	263	9855.33	2732.56
				GRAND TOTAL	**410**	**13693.71**	**3660.97**

PORT OF VALLEYFIELD ★ VALPORT Les services maritimes inc. Maritime Services Inc. Valleyfield, Québec, Canada

Capt. Rosaire A. Borg.

VALPORT
Les services maritimes inc.
Maritime Services Inc.

MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE NAVIRE SOMMAIRE / VESSEL REPORT SUMMARY

NAVIRE / VESSEL :Rosaire Voy: 1 PORT DE CHARGEMENT / PORT OF LOADING: VALLEYFIELD

DATE: 5-Aug-16 PORT DE DÉCHARGEMENT / PORT OF DISCHARGE: MARY RIVER

TOTAUX DU CHARGEMENT / LOADING TOTALS

DESTINATION: PORT

QUANTITÉ QUANTITY	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (MT)
57	CONTENEUR / CONTAINERS	2407.96	662.95
0	SURDIMENSIONNÉ / OVER-DIMENSIONAL	0.00	0.00
1	MOBILE (0 - 10 MT)	43.23	3.58
0	MOBILE (10 - 50 MT)	0.00	0.00
0	MOBILE (50 - 100 MT)	0.00	0.00
85	MARCHANDISE GÉNÉRALE / GENERAL MERCHANDISE	1194.44	222.09
4	MATIÈRES DANGEREUSES / DANGEROUS GOODS	192.75	39.80

TOTAUX DU CHARGEMENT / LOADING TOTALS

DESTINATION: MINE

QUANTITÉ QUANTITY	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (MT)
69	CONTENEUR / CONTAINERS	2698.50	646.23
0	SURDIMENSIONNÉ / OVER-DIMENSIONAL	0.00	0.00
2	MOBILE (0 - 10 MT)	84.95	8.28
17	MOBILE (10 - 50 MT)	2136.52	450.24
5	MOBILE (50 - 100 MT)	1081.89	250.66
128	MARCHANDISE GÉNÉRALE / GENERAL MERCHANDISE	2306.49	625.95
42	MATIÈRES DANGEREUSES / DANGEROUS GOODS	1546.98	751.20

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Maritime Services Inc.

MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT

DATI 05-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
116672	D3	OPEN CAGE STC:□ -UN1978 30 PROPANE TANKS, CLASS 2.1	586
117787	TD2	CRATE STC:□ -UN1133 1 x FIBERBOARD BOX ADHESIVE, CLASS 3, PG: II□ -UN1133 5 x STEEL DRUMS ADHESIVE, CLASS 3, PG: II□ -UN1263 2 x FIBERBOARD BOXES PAINT, CLASS 3, PG: II□ -UN1133 5 x FIBERBOARD BOXES ADHESIVES, CLASS 3, PG: II	600
300351	D1	20' CONTAINER 289200-0 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	2218
300352	D1	20' CONTAINER 349119-2 STC:□ -UN194 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22180
300353	D1	20' CONTAINER 348839-4 STC: □ -UN1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22185
300354	D1	20' CONTAINER 349177-8 STC:□ -UN1942 AMMONIUM NITRATE CLASS 5.1 PG: III QTY 20 BAGS NET WT 20,000 KGS	22185
300355	D1	20' CONTAINER 349963-4 STC:□ -UN1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22240

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT

DATI 05-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
300356	D1	20' CONTAINER 349577-3 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22240
300357	D1	20' CONTAINER 396395-5 STC;□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22185
300358	D1	20' CONTAINER 348548-2 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22240
300359	D1	20' CONTAINER 352209-8 STC:□ UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22240
300360	D1	20' CONTAINER 350141-2 STC: □ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22240
300361	D1	20' CONTAINER 358929-7 STC: □ -UN1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22200
300362	D1	20' CONTAINER 351360-3 STC:□ -UN1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NEW WT 20,000 KGS	22185
300363	D1	20' CONTAINER 352795-2 STC: □ -UN1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 NET WT 20,000 KGS	22240

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT

DATI 05-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
300364	D1	20' CONTAINER 352825-0 STC:□ -UN1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22240
300365	D2	20' CONTAINER 348336-6 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 NET WT 20,000 KGS	22200
300366	D2	20' CONTAINER 350781-1 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 NET WT 20,000 KGS	22185
300367	D1	20' CONTAINER 349112-4 STC: □ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 NET WT 20,000 KGS	22185
300368	D1	20' CONTAINER 353956-8 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22185
300369	D1	20' CONTAINER 358789-0 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22200
300370	D1	20' CONTAINER 353794-5 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22185
300371	D1	20' CONTAINER 352613-3 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22240

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT

DATI 05-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
300372	D2	20' CONTAINER 359011-1 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22200
300373	D2	20' CONTAINER 359291-6 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22200
300374	D1	20' CONTAINER 352048-0 STC: □ -UN 9142 AMMONIUM NITRATE CLASS 5.1, PG: III QT 20 BAGS NET WT 20,000 KGS	22240
300375	D1	20' CONTAINER 351734-2 STC: □ -UN1942 AMMONIUM NITRATE CLASS5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22185
300376	D1	20' CONTAINER 325931-9 STC: □ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	22220
300377	D1	20' CONTAINER 320857-3 STC: □ -UN 1942 AMMONIUM NITRATE CLASS 5.1, □ PG: III QTY 20 BAGS NET WT 20,000 KGS	22250
300378	D1	20' CONTAINER 320680-0 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1,□ PG: III QTY 20 BAGS NET WT 20,000 KGS	22250
300379	D1	20' CONTAINER 353893-6 STC: □ -UN 1942 AMMONIUM NITRATE CLASS 5.1,□ PG: III QTY 20 BAGS NET WT 20,000 KGS	22185

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT DATI 05-Aug-16
NAVIRE / VESSEL : Rosaire Voy: 1

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
300380	D1	20' CONTAINER 349800-5 STC:□ -UN 1942 AMMONIUM NITRATE CLASS 5.1,□ PG: III QTY 20 BAGS NET WT 20,000 KGS	22240
300381	D1	20' CONTAINER 35113-3 STC: □ -UN 1942 AMMONIUM NITRATE CLASS 5.1, PG: III QTY 20 BAGS NET WT 20,000 KGS	21185
300402	D2	20' CONTAINER 232679-1 STC: □ - UN1999 ASPHALT STODDART SOLVENT, CLASS 3, PG: III 6 PAILS - 32 GALLONS□ - UN1814 POTASSIUM HYDROXIDE SOLUTION, CLASS 8, PG: II 1 PAIL - 35 GALLONS□ - UN1791 SODIUM HYPOCHLORIDE SOLUTION, CLASS 8, PG: III 1 PAIL - 45 GALLONS□ - UN2920 FLAMMABLE CORROS	7343
300418	D3	20' CONTAINER 239440-9 STC:□ UN1760 CORROSIVE LIQUID CLASS 8, PG: III□ 24 PACKAGES 1.2 KGS PETROLEUM BASED SOLDERING FLUX	6506
300453	D3	20' CONTAINER 217173-0 STC:□ UN1072 150 CYLINDERS OXYGEN, CLASS 2.2(5.1)	11245
300454	D3	20' CONTAINER 232226-3 STC: □ - UN1072 OXYGEN 65 CYLINDERS, CLASS 2.2(5.1)□ - UN1956 ARGON 60 CYLINDERS, CLASS 2.2	11152
300455	D3	20' CONTAINER 242956-8 STC:□ -UN1072 150 CYLINDERS OF OXYGEN, CLASS 2.2(5.1)	11280

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RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT

DATI 05-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
300456	D3	20' CONTAINER 679283-0 STC: □ -UN1001 100 CYLINDERS OF ACETYLEN, CLASS 2.1	10938
300463	D3	20' CONTAINER 311007-7 STC: □ -UN1072 150 CYLINDERS OXYGEN, CLASS 2.2(5.1)	11060
300464	D3	20' CONTAINER 200635-6 STC:□ -UN1956 100 BLUESHIELD CYLINDERS, CLASS 2.2	10480
300467	D3	20' CONTAINER 841692-5 STC:□ . -UN1075 5 PROPANE CYLINDERS, CLASS 2.1□ -UN1075 50 PROPANE CYLINDERS, CLASS 2.1□ -UN1001 10 ACETYLEN CYLINDERS, CLASS 2.1	2330
300474	D3	20' CONTAINER 655794-9 STC:□ -UN1072 90 CYLINDERS OF OXYGEN, CLASS 2.2(5.1)	7621
300475	D3	20' CONTAINER 220117-6 STC:□ -UN1956 145 CYLINDERS OF N.O.S. BLUESHIELD, CLASS 2.2□ -UN1006 15 CYLINDERS OF ARGON, CLASS 2.2□ -UN1013 5 CYLINDERS OF CARBON DIOXIDE, CLASS 2.2	15765
300480	D3	40' CONTAINER 413242-6 STC:□ -UN1044 6 x FIRE EXTINGUISHERS, CLASS 2.2	10056
300483	D3	20' CONTAINER 267701-9 STC:□ -UN2794 47 x BATTERIES, CLASS 8□ -UN3164 67 x FIBERBOARD BOXES ARTICLES PRESSURIZED, PNEUMATIC, CLASS 2.2	5513

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RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT DATI 05-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
302255	D3	20' CONTAINER 305855-0 STC:□ -UN2722, LITHIUM NITRATE CLASS 5.1, PG: III 5 FIBERBOARD BOXES x 20 KG□ -UN1956, COMPRESSES GAS (ARGON) CLASS 2.2, 2 CYLINDERS x 49 KGS	6478

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: PORT

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115404	D3	2 x FLATEBED 3 AXLES UNIT NOS: 923197/923203	162.03	20412
115405	D3	2 x FLATEBED 3 AXLES UNIT NOS: 923201/923212	162.03	20412
115406	D3	2 x FLATEBED 3 AXLES UNIT NOS: 923205/923296	162.03	20412
115561	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115562	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115563	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115564	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115565	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115566	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115567	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115568	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115569	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115570	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115571	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115572	TD1	PLYWOOD 1/2" x 4' x 8'	2.56	1332
115576	TD1	PLYWOOD, 3/4" x 4' x 8'	2.62	1223
115577	TD3	PLYWOOD, 3/4" x 4' x 8'	2.62	1223
115578	TD1	PLYWOOD, 3/4" x 4' x 8'	2.62	1223
115579	TD1	PLYWOOD, 3/4" x 4' x 8'	2.62	1223
115580	TD1	PLYWOOD, 1/2" x 4' x 8'	1.79	1332
115782	TD1	20 DIAMOND GRATING GALVANIZED 9 1/2 x 2 x 12GA	0.93	588
115783	TD1	4 DIAMOND GRATING GALVANIZED 7 x 3 x 12GA	0.33	113
115786	TD1	20 DIAMOND GRATING GALVANIZED 9 1/2 x 2 x 12	0.87	588
115787	TD1	6 WELDED BAR GRATING GALVANIZED 3/16 x 1 1/4 x 19 - 4 B/G	1.78	1739

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16
NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: PORT

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115788	TD1	6 WELDED BAR GRATING GALVANIZED 3/16 x 1 1/4 x 19 - 4 B/G	1.78	1739
115789	TD1	6 WELDED BAR GRATING GALVANIZED 3/16 x 1 1/4 x 19 - 4 B/G	1.78	1739
115790	TD1	11-3/4 x 2 x 12GA DIA S/T W/END	0.14	73
116359	TD1	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116360	TD1	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116361	D3	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116529	TD1	CRATE C/W GUIDES, RETAINER, LOOP, PARTS	2.01	472
116531	TD1	CRATE COVERED WITH WHITE PLASTIC 5/12	14.01	2726
116532	TD1	CRATE COVERED WITH WHITE PLASTIC 1/12	14.01	2726
116533	TD1	CRATE COVERED WITH WHITE PLASTIC 2/12	14.01	2726
116534	TD1	CRATE COVERED WITH WHITE PLASTIC 3/12	14.01	2726
116535	TD1	CRATE COVERED WITH WHITE PLASTIC 6/12	14.01	2726
116536	TD1	CRATE COVERED WITH WHITE PLASTIC 4/12	14.01	2726
116537	TD1	WOODEN CRATE	4.05	2048
116538	TD1	WOODEN CRATE	4.05	2053
116549	TD1	STEEL PLATE 16/11	0.12	845
116550	TD1	STEEL PLATE 16/11	0.12	845
116552	TD1	STEEL PLATE 16/11	0.12	845
116553	TD1	STEEL PLATE 16/11	0.12	845
116554	TD1	STEEL PLATE 16/11	0.12	845
116555	TD1	STEEL PLATE 16/11	0.12	845
116556	TD1	STEEL PLATE 16/11	0.12	845
116559	TD1	STEEL PLATE 12/11	0.12	720
116560	TD1	STEEL PLATE 12/11	0.12	720

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: PORT

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M³)	POIDS WEIGHT (KGS)
116561	TD1	STEEL PLATE 16/11	0.12	845
116562	TD1	STEEL PLATE 20/11	0.06	466
116563	TD1	STEEL PLATE 20/11	0.06	466
116564	TD1	STEEL PLATE 20/11	0.02	1398
116589	D3	12 CULVERTS	53.58	14609
116590	D3	12 CULVERTS	53.58	14609
116593	D3	CULVERTS	53.58	13836
116594	D3	CULVERTS	53.58	13836
116640	LH2	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116641	LH2	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116642	LH2	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116643	LH2	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116644	LH2	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116651	TD1	F-350 SUPER DUTY SERVICE TRUCK VIN# 1FT8W3BTGGEA33821	43.23	3581
116668	D3	TRAILER FOR CONSTUCTION SITE MR00140	254.44	12700
116669	TD3	WATER TANK, 1000 GALLONS WITH PUMP	7.73	590
116671	TD1	SEWAGE TANK, 1000 GALLONS	8.12	545
116673	D3	OPEN CRATE STC: TELESCOPIC CHUTE	10.58	8664
116676	TD1	STEEL GRATING	0.90	2247
116677	TD1	STEEL GRATING	0.90	2247
116685	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116686	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116687	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116688	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: PORT

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116689	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116690	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116691	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116692	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116693	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116694	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116695	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116696	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116697	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116699	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116700	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116701	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116702	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116703	LH2	TIRE 14.00 R25NH3 TYPE 25	0.69	186
300385	LH1	20' CONTAINER 352730-9 SEAL NO: 2971457 STC: MIXED CARGO	38.55	9180
300386	LH2	20' CONTAINER 352015-6 SEAL NO: 2971458 STC: MIXED CARGO	38.55	14678
300387	D4	20' CONTAINER 352255-0 SEAL NO: 2971459 STC: MIXED CARGO	38.55	4618
300391	LH2	40' HC CONTAINER CBHU805431-9 SEAL NO: 2971405 STC: TIRES	86.03	18553
300392	LH2	40' HC CONTAINER CBHU992607-8 SEAL NO: 2971406 STC: TIRES	86.03	19240
300394	D2	20' CONTAINER 350996-4 SEAL NO: 2971464 STC: TOOLS & RACKS	38.55	7801
300395	LH1	20' CONTAINER 352425-4 SEAL NO: 2971465 STC: MIXED CARGO	38.55	10850
300397	LH2	20' CONTAINER 352922-0 SEAL NO: 2971467 STC: MIXED CARGO	38.55	10235
300401	LH2	20' CONTAINER 884134-6 SEAL NO: 2971471 STC: BRAKE DRUMS & 2 TANKS HYDRAUFLO KIT	38.55	20093

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RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: PORT

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300402	D2	20' CONTAINER 232679-1 SEAL NO: 2971472 STC: DYNO NOBEL MIXED CARGO	38.55	7343
300403	LH2	20' CONTAINER 300905-0 SEAL NO: 2971473 STC: PARAFLEX TOTES, TOTE, SOD. THIOCYANATE	38.55	11125
300409	LH2	20' CONTAINER 350181-3 SEAL NO: 2971479 STC: HDUTY XLIFE 60/40 1000L - NR - LIQUID COOLER FOR DIESEL MOTOR	38.55	14040
300410	LH2	20' CONTAINER 239686-5 SEAL NO: 2971480 STC: HDUTY XLIFE 60/40 1000L - NR - LIQUID COOLER FOR DIESEL MOTOR	38.55	14050
300411	LH1	20' CONTAINER 906510-2 SEAL NO: 2971454 STC: HDUTY XLIFE 60/40 1000L - NR - LIQUID COOLER FOR DIESEL MOTOR	38.55	14030
300412	D2	20' CONTAINER 302343-9 STC: PRECISION SYNTHETIQUE MOLY 2 DRUMS	38.55	7366
300414	LH2	20' CONTAINER 239489-9 STC: MIXED CARGO	38.55	10391
300415	LH1	20' CONTAINER 301906-4 STC: MIXED CARGO	38.55	9486
300423	LH1	20' CONTAINER 349378-6 STC: DURON-E SYNTHETIC 5W-40 1040	38.55	12040
300424	LH2	20' CONTAINER 326067-0 STC: DURON-E SYNTHETIC 5W-40 1040	38.55	12020
300429	LH1	20' CONTAINER 2168486 STC: PRODURO TO-4 + SYN ALL SEASON	38.55	12040
300433	LH1	20' CONTAINER 386176-1 STC: MIXED CARGO	38.55	13020
300436	LH2	20' CONTAINER 300554-3 STC: PRODURO TO-4 + SYN ALL SEASON	38.55	12050
300438	LH1	20' CONTAINER 232383-2 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12250
300439	LH1	20' CONTAINER 301472-0 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12250

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300440	LH1	20' CONTAINER 232385-3 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12250
300441	LH1	20' CONTAINER 233468-9 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12250
300442	LH1	20' CONTAINER 752243-7 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12300
300443	LH2	20' CONTAINER 194692-1 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12275
300444	LH2	20' CONTAINER 217434-4 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12240
300445	LH2	20' CONTAINER 398993-0 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12185
300446	LH2	20' CONTAINER 238149-0 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12250
300447	LH2	20' CONTAINER 308720-0 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12280
300448	LH2	20' CONTAINER 300717-1 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12250
300450	LH1	20' CONTAINER # 216476-8 SEAL #2971519 STC:10 TOTE BAGS CHLORURE DE CALCIUM	38.55	10000
300452	LH1	20' CONTAINER 738092-3 SEAL # 2971521 STC: PRECISION SYNTHETIC MOLY MIXTE, PRODURO TO -4 +SYN ALL SEASON, DURON-E SYNTHETIC	38.55	11482

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300453	D3	20' CONTAINER 217173-0 STC: 150 CYLINDERS OF OXYGEN COMPRESSED	38.55	11245
300454	D3	20' CONTAINER 232226-3 STC: 65 CYLINDERS OF OXYGEN & 60 CYLINDERS OF ARGON	38.55	11152
300458	D4	20' CONTAINER #325904-0 SEAL #2971527 STC: MIXED CARGO	38.55	5564
300461	D4	20' CONTAINER 276479-8 STC: MIXED CARGO	38.55	5844
300465	LH2	40' CONTAINER 420105-0 STC: 30 SKIDS	77.10	23139
300466	LH2	40' CONTAINER 418088-8 STC: 33 SKIDS	77.10	14291
300476	LH2	40' CONTAINER 407018 STC: 22 SKIDS	38.55	16441
300480	D3	40' CONTAINER 413242-6 STC: 34 SKIDS & FIRE EXTINGUISHERS	77.10	10056
300492	D2	40' CONTAINER 416785-0 STC: MIXED CARGO	77.10	20045
300494	D2	20' CONTAINER 335496-7 STC: MIXED CARGO	38.55	9588
302258	D3	20' REEFER CONTAINER SUDU1035607 STC: REFRIGERATED FOOD DO NOT FREEZE	38.55	12932
302501	D3	20' REEFER CONTAINER SUDU1033008 STC: FROZEN FOOD	38.55	10785
302506	D2	20' REEFER CONTAINER SUDU1032439 STC: REFRIGERATED FOOD DO NOT FREEZE	38.55	7566
302508	D4	20' CONTAINER GTCU2016672 STC: DRY FOOD	38.55	7882
302515	D4	20' CONTAINER GTCU2016693 STC: DRY FOOD	38.55	9080
302518	D4	20' CONTAINER GTCU2016008 STC: DRY FOOD	38.55	7813
302519	D3	20' REEFER CONTAINER SUDU-1032655 SEAL # 6685355 STC: FROZEN FOOD	38.55	11376
302521	D4	20' REEFER CONTAINER SUDU1031031 STC: FROZEN FOOD	38.55	12709
302522	D3	20' REEFER CONTAINER SUDU3805296 STC: FROZEN FOOD	38.55	10621

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302526	D3	20' REEFER CONTAINER SUDU1037786 STC: FROZEN FOOD	38.55	8492
302530	D3	20' REEFER CONTAINER SUDU1031685 STC: FROZEN FOOD	38.55	8238
302535	D3	20' REEFER CONTAINER 270392-2 SEAL#6685327 STC: FROZEN FOOD	38.55	9051
302536	D3	20' REEFER CONTAINER SUDU 103862-7 SEAL#6685328 STC: FROZEN FOOD	38.55	8660
302543	D4	20' CONTAINER XINU 1006806 STC: WASHROOM & FORKLIFT	38.55	8086
302553	D3	20' REEFER CONTAINER SUDU1036795 STC: REFRIGERATED FOOD DO NOT FREEZE	38.55	11444
302555	D3	20' REEFER CONTAINER BISU3148939 STC: FROZEN FOOD	38.55	10137

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
114230	TD1	LUMBER 2 x 4 x 8 CRATE NO: Y024813	2.89	1091
114279	LH2	RUBBER CONVEYOR BELT ROLL	10.21	8510
114410	D2	1 REEL	2.97	1203
114411	D2	1 REEL	2.97	1203
114412	D2	1 REEL	2.97	1203
115301	TD3	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024746	2.65	1303
115312	TD1	PLYWOOD 3/4 x 4 x 8 CRATE NO: Y024749	2.62	1274
115678	TD3	WHITE PLASTIC TANK	10.41	136
115679	TD3	WHITE PLASTIC TANK	10.41	136
115776	TD1	4 DIAMOND GRATING GALVANIZED 7 x 3 x 12' (RED + BLUE)	0.60	113
115777	TD1	4 DIA S/T W/END PLT 11-3/4 x 2 x 12GA (RED + BLUE)	0.60	73
116362	LH2	CONVEYOR BELTS ROLL	8.49	7468
116363	LH2	CONVEYOR BELTS ROLL	8.49	7468
116372	TD1	1 ROLLED ALLOY PLATE 8 x 10 x 2	0.37	2964
116373	TD1	1 ROLLED ALLOY PLATE 8 x 10 x 2	0.37	2964
116374	TD1	1 ROLLED ALLOY PLATE 8 x 10 x 2	0.37	2964
116375	TD1	1 ROLLED ALLOY PLATE 8 x 10 x 2	0.37	2964
116376	TD1	1 ROLLED ALLOY PLATE 8 x 10 x 2	0.37	2964
116377	TD1	1 HOT ROLL PLATE 8 x 10 x 2	0.37	2964
116392	TD1	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116393	TD1	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116425	LH2	ROLL BELTING	6.96	6055
116426	LH2	ROLL BELTING	8.57	7580
116427	LH2	ROLL BELTING	8.57	7943

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116428	TD3	988H WHEEL LOADER SERIAL # BXY04600 WITH BUCKET	221.68	50144
116429	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116430	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116431	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116432	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116433	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116434	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116435	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116436	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116437	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116438	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116439	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116440	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116441	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116442	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116443	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116444	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116445	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116446	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116447	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116448	TD1	10' LONG CONCRETE JERSEY BARRIER	1.66	1973
116449	TD2	988 BUCKET FOR BXY05303	22.13	5000
116450	TD2	988 BUCKET FOR BXY05531	22.13	5000
116451	TD3	988 WHEEL LOADER SERIAL # BXY04433 WITH BUCKET	221.68	50144

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116487	D3	WASHCAR	100.10	4500
116488	TD3	WATER TANK	8.99	590
116489	D2	REELS OF CABLE	4.72	2699
116490	D2	REELS OF CABLE	4.72	2683
116491	D2	REELS OF CABLE	4.72	2677
116492	D2	REELS OF CABLE	4.72	2653
116493	D2	REELS OF CABLE	4.72	2658
116494	TD1	REELS OF CABLE	2.47	903
116495	D2	REELS OF CABLE	2.47	900
116496	D2	REEL OF CABLE	4.72	2659
116497	D2	REEL OF CABLE	4.72	2658
116501	D2	REEL OF CABLE	4.72	1741
116523	TD3	SEWAGE TANK USED	7.49	545
116524	TD3	SEWAGE TANK USED	7.49	545
116530	TD1	CRATE C/W GUIDES, RETAINER, LOOP, PARTS	2.01	472
116539	TD1	CRATE COVERED WITH WHITE PLASTIC 7/12	14.07	2726
116540	TD1	CRATE COVERED WITH WHITE PLASTIC 10/12	14.07	2726
116541	TD3	CRATE COVERED WITH WHITE PLASTIC 12/12	14.07	2726
116542	TD3	CRATE COVERED WITH WHITE PLASTIC 11/12	14.07	2726
116543	TD3	CRATE COVERED WITH WHITE PLASTIC 8/12	14.07	2726
116544	TD3	CRATE COVERED WITH WHITE PLASTIC 9/12	14.07	2726
116545	D1	2012 WESTERN STAR WHITE VIN# 5KJJALDR2CPBN2892	86.10	12184
116546	D1	2012 WESTERN STAR WHITE VIN# 5KJJALDR4CPBN2893	86.10	12184
116547	TD2	FORD F-350 VIN # 1FT8W3BT6GEC65528	38.32	4200

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116548	D1	WESTERN STAR RED VIN # 5KJJAEAV37PX05825	86.10	12184
116567	TD1	ROLL BELTING	11.56	9752
116568	TD1	ROLL BELTING	10.21	8725
116569	LH2	ROLL BELTING	10.21	8725
116580	TD2	WESTERN STAR MODEL 6900XD S/N# HX5452	87.63	16363
116581	LH2	BELT REEL CONVEYOR	13.53	11386
116586	TD2	SIDE-DUMP TRAILER SERIAL #712807	118.48	20857
116595	TD2	SIDE-DUMP TRAILER SERIAL #712808 MODEL HDT4-38-23 OFF ROAD TRAILER	139.62	21283
116596	TD2	SIDE-DUMP TRAILER SERIAL # 712811 MODEL HDT4-32-23 OFF ROAD TRAILER	118.48	20857
116597	TD2	SIDE DUMP TRAILER SERIAL # 712804 MODEL HDT4-38-23	139.62	21283
116598	TD2	WESTERN STAR MODEL 6900XD VIN# SKJJASD19HPHX5454	87.63	16363
116599	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116600	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116601	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116602	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116603	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116604	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116605	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116606	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116607	TD1	JAWS, COAL, ORE, STONE CRUSHER NMFC	0.81	2874
116608	TD2	988 WHEEL LOADER BUCKET S/N # T1A07911	21.04	5144
116609	TD3	988 WHEEL LOADER BUCKET S/N # T1A08321	21.04	5144

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M³)	POIDS WEIGHT (KGS)
116610	TD3	988 WHEEL LOADER BUCKET S/N # T1A08269	21.04	5144
116611	TD1	SIDE DUMP TRAILER SERIAL # 712805	118.48	20857
116612	TD2	SIDE DUMP TRAILER S/N # 712806	139.62	21283
116613	D1	WESTERN STAR VIN # 5KJJKLBGSOPBT4187	83.10	15005
116615	TD2	120 TON FLOAT + GOOSE NECK	125.83	21700
116616	TD2	RED BUS USED UNIT # 113-26	99.04	15000
116617	TD2	SIDE DUMP TRAILER # 712812	139.62	21283
116618	TD2	SIDE DUMP TRAILER #712810	139.62	21283
116622	D3	WESTERN STAR MODEL 6900XD VIN# 5KJJASD17HPHX5453	87.63	16363
116623	LH2	CONVEYOR BELT	11.41	9947
116624	TD1	SIDE DUMP TRAILER# 712809	119.39	20857
116625	TD2	F-350 SERVICE TRUCK UNIT # 107-35	46.63	4082
116627	TD1	SIDE DUMP TRAILER # 712813	118.48	20857
116628	TD2	WESTERN STAR MODEL 6900XD VIN# 5KJJASD10HPHX5455	87.63	16363
116629	TD2	WESTERN STAR MODEL 6900XD VIN# 5KJJASD13HPHX5451	87.63	16363
116630	TD3	988 LOADER UNIT # 11-17 WITH BUCKET #06-54	221.68	50144
116649	TD2	SIDE DUMP TRAILER # 712814	139.62	21283
116650	TD1	SIDE DUMPER TRAILER # 712815	118.48	20857
116652	TD3	988 LOADER UNIT # 11-18 WITH BUCKET #06-43	221.68	50144
116653	TD1	CRATE	2.32	231
116654	TD2	EXCAVATOR 345 UNIT #23-10 WITH BUCKET #D6-30	173.80	50500
116655	TD3	988 H LOADER #OBXY05485	203.41	47000
116656	TD3	988 H LOADER # OBXY05303	203.41	47000
116658	TD3	988 H LOADER # KBXY 04579	203.41	47000

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116659	LH2	988H LOADER #OBXY05461	203.41	47000
116660	TD3	988 LOADER #OBXY05531	182.86	47000
116661	TD2	WESTERN STAR MODEL 6900XD VIN# 5KJJASD11HPHX5450	87.63	16363
116662	LH2	CONVEYOR BELT ROLL	11.49	9875
116663	TD1	CRATE STC: 988 STEERING PARTS	1.01	300
116664	TD1	CRATE	0.56	624
116665	TD1	PALLET WITH 2 GEARS	0.36	332
116666	TD1	PALLET WITH A CHAIN	1.46	4666
116672	D3	OPEN CAGE STC: 30 PROPANE TANKS	4.14	586
116678	TD2	ROCK CRUSHER SANDVIK QH441	195.17	50080
117786	TD1	CRATE ROOFING SUPPLIES	4.88	1000
117787	TD2	CRATE STC: ADHESIVES & PAINT	0.84	600
117836	TD1	JAW COAL STONE CRUSHER	0.81	2898
117837	TD1	JAW COAL STONE CRUSHER	0.81	2898
117838	TD1	JAW COAL STONE CRUSHER	0.81	2898
117839	TD1	JAW COAL STONE CRUSHER	0.81	2898
117840	TD1	JAW COAL STONE CRUSHER	0.81	2898
117841	TD1	JAW COAL STONE CRUSHER	0.81	2898
117842	TD1	JAW COAL STONE CRUSHER	0.81	2898
117843	TD1	JAW COAL STONE CRUSHER	0.81	2898
117844	TD1	JAW COAL STONE CRUSHER	0.81	2898
117845	TD1	JAW COAL STONE CRUSHER	0.81	2898
117846	TD1	JAW COAL STONE CRUSHER	0.81	2898
117847	TD1	JAW COAL STONE CRUSHER	0.81	2898

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
117848	TD1	JAW COAL STONE CRUSHER	0.81	2898
117849	TD1	JAW COAL STONE CRUSHER	0.81	2898
118010	TD1	JAW COAL STONE CRUSHER	0.81	2789
118011	TD1	JAW COAL STONE CRUSHER	0.81	2789
118012	TD1	JAW COAL STONE CRUSHER	0.81	2789
118013	TD1	JAW COAL STONE CRUSHER	0.81	2789
118014	TD1	JAW COAL STONE CRUSHER	0.81	2789
118015	TD1	JAW COAL STONE CRUSHER	0.81	2789
118016	TD1	JAW COAL STONE CRUSHER	0.81	2789
118017	TD1	JAW COAL STONE CRUSHER	0.81	2789
118018	TD1	JAW COAL STONE CRUSHER	0.81	2789
300351	D1	20' CONTAINER 289200-0 SEAL NO: 2971423 STC: AMMONIUM NITRATE	38.55	2218
300352	D1	20' CONTAINER 349119-2 SEAL NO: 2971424 STC: AMMONIUM NITRATE	38.55	22180
300353	D1	20' CONTAINER 348839-4 SEAL NO: 2971425 STC: AMMONIUM NITRATE	38.55	22185
300354	D1	20' CONTAINER 349177-8 SEAL NO: 2971426 STC: AMMONIUM NITRATE	38.55	22185
300355	D1	20' CONTAINER 349963-4 SEAL NO: 2971427 STC: AMMONIUM NITRATE	38.55	22240
300356	D1	20' CONTAINER 349577-3 SEAL NO: 2971428 STC: AMMONIUM NITRATE	38.55	22240

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300357	D1	20' CONTAINER 396395-5 SEAL NO: 2971429 STC: AMMONIUM NITRATE	38.55	22185
300358	D1	20' CONTAINER 348548-2 SEAL NO: 2971430 STC: AMMONIUM NITRATE	38.55	22240
300359	D1	20' CONTAINER 352209-8 SEAL NO: 2971431 STC: AMMONIUM NITRATE	38.55	22240
300360	D1	20' CONTAINER 350141-2 SEAL NO: 2971432 STC: AMMONIUM NITRATE	38.55	22240
300361	D1	20' CONTAINER 358929-7 SEAL NO: 2971433 STC: AMMONIUM NITRATE	38.55	22200
300362	D1	20' CONTAINER 351360-3 SEAL NO: 2971434 STC: AMMONIUM NITRATE	38.55	22185
300363	D1	20' CONTAINER 352795-2 SEAL NO: 2971435 STC: AMMONIUM NITRATE	38.55	22240
300364	D1	20' CONTAINER 352825-0 SEAL NO: 2971436 STC: AMMONIUM NITRATE	38.55	22240
300365	D2	20' CONTAINER 348336-6 SEAL NO: 2971437 STC: AMMONIUM NITRATE	38.55	22200
300366	D2	20' CONTAINER 350781-1 SEAL NO: 2971438 STC: AMMONIUM NITRATE	38.55	22185
300367	D1	20' CONTAINER 349112-4 SEAL NO: 2971439 STC: AMMONIUM NITRATE	38.55	22185
300368	D1	20' CONTAINER 353956-8 SEAL NO: 2971440 STC: AMMONIUM NITRATE	38.55	22185

VALPORT
Les services maritimes inc.
Maritime Services Inc.

MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16
NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300369	D1	20' CONTAINER 358789-0 SEAL NO: 2971441 STC: AMMONIUM NITRATE	38.55	22200
300370	D1	20' CONTAINER 353794-5 SEAL NO: 2971442 STC: AMMONIUM NITRATE	38.55	22185
300371	D1	20' CONTAINER 352613-3 SEAL NO: 2971443 STC: AMMONIUM NITRATE	38.55	22240
300372	D2	20' CONTAINER 359011-1SEAL NO: 2971444 STC: AMMONIUM NITRATE	38.55	22200
300373	D2	20' CONTAINER 359291-6 SEAL NO: 2971445 STC: AMMONIUM NITRATE	38.55	22200
300374	D1	20' CONTAINER 352048-0 SEAL NO: 2971446 STC: AMMONIUM NITRATE	38.55	22240
300375	D1	20' CONTAINER 351734-2 SEAL NO: 2971447 STC: AMMONIUM NITRATE	38.55	22185
300376	D1	20' CONTAINER 325931-9 SEAL NO: 2971448 STC: AMMONIUM NITRATE	38.55	22220
300377	D1	20' CONTAINER 320857-3 SEAL NO: 2971449 STC: AMMONIUM NITRATE	38.55	22250
300378	D1	20' CONTAINER 320680-0 SEAL NO: 2971450 STC: AMMONIUM NITRATE	38.55	22250
300379	D1	20' CONTAINER 353893-6 SEAL NO: 2971451 STC: AMMONIUM NITRATE	38.55	22185
300380	D1	20' CONTAINER 349800-5 SEAL NO: 2971452 STC: AMMONIUM NITRATE	38.55	22240

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Les services maritimes inc.
Maritime Services Inc.

MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300431	LH1	20' CONTAINER 914957-0 STC: DURON E SYNTHETIC 5W-40	38.55	12030
300432	LH2	20' CONTAINER 737422-1 STC: DURON E SYNTHETIC 5W-40	38.55	12120
300434	LH2	20' CONTAINER 349874-6 STC: MIXED CARGO	38.55	12064
300435	D4	20' CONTAINER 753413-0 STC: MIXED CARGO	38.55	7319
300451	LH1	20' CONTAINER 252201-9 STC: MIXED CARGO	38.55	12050
300455	D3	20' CONTAINER 242956-8 STC: 150 CYLINDERS OF OXYGEN COMPRESSED	38.55	11280
300456	D3	20' CONTAINER 679283-0 STC: 100 CYLINDERS OF ACETYLEN DISSOLVED	38.55	10938
300459	LH1	20' CONTAINER #294625-2 SEAL#2971528 STC: HYDREX EXTREME	38.55	9800
300462	D4	20' CONTAINER 243009-1 STC: REFRACTORY MODULES & BEDDING	38.55	5043
300463	D3	20' CONTAINER 311007-7 STC: 150 CYLINDERS OF OXYGEN	38.55	11060
300464	D3	20' CONTAINER 200635-6 STC: 100 BLUESHIELD CYLINDERS	38.55	10480
300467	D3	20' CONTAINER 841692-5 STC: 5 PROPANE CYLINDERS, 50 PROPANE CYLINDERS & 10 ACETYLEN CYLINDERS	38.55	2330
300469	LH1	20' CONTAINER 274597-2 STC: MIXED CARGO	38.55	10369
300474	D3	20' CONTAINER 655794-9 STC: 90 CYLINDERS OF OXYGEN	38.55	7621
300475	D3	20' CONTAINER 220117-6 STC: 145 CYLINDERS OF N.O.S. BLUESHIELD, 15 CYLINDERS OF ARGON & 5 CYLINDERS OF CARBON DIOXIDE	38.55	15765
300484	D2	20' CONTAINER 128208-2 STC: PALLETS OF STEEL CONVEYOR PARTS	38.55	5874

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300485	D2	20' CONTAINER 235895-2 STC: PALLETS OF STEEL CONVEYOR PARTS	38.55	7008
300486	D3	20' CONTAINER 369205-0 STC: PALLETS OF STEEL CONVEYOR PARTS	38.55	5816
300487	D3	20' CONTAINER 216930-5 STC: PALLETS OF STEEL CONVEYOR PARTS	38.55	7147
300488	D2	20' CONTAINER 116816-7 STC: PALLETS OF STEEL CONVEYOR PARTS	38.55	5177
300489	D2	20' CONTAINER 123171-6 STC: BOWL HP 400(1) - MANTLE HP 400(1)	38.55	12934
300493	D2	20' CONTAINER 129564-4 STC: MIXED CARGO	38.55	9135
302255	D3	20' CONTAINER NONU 305855-0 STC: ALS MIXED CARGO	38.55	6478
302256	LH1	20' CONTAINER 955499-2 STC: CARGO UNDER WARRANTY	38.55	12500
302259	D4	20' CONTAINER GTCU2016081 STC: DRY FOOD	38.55	7365
302260	D3	20' REEFER CONTAINER SUDU1037868 STC: REFRIGERATED FOOD DO NOT FREEZE	38.55	11266
302502	D3	20' REEFER CONTAINER SUDU1033142 STC: FROZEN FOOD	38.55	11683
302503	D4	20' REEFER CONTAINER SUDU1031469 STC: FROZEN FOOD	38.55	13295
302504	D3	20' REEFER CONTAINER SUDU1038376 STC: FROZEN FOOD	38.55	9010
302505	D3	20' REEFER CONTAINER SUDU1031767 STC: FROZEN FOOD	38.55	6645
302507	D4	20' CONTAINER GTCU2016203 STC: DRY FOOD	38.55	8024
302509	D4	20' CONTAINER GTCU2016184 STC: DRY FOOD	38.55	7605
302513	D3	20' REEFER CONTAINER SUDU2657608 STC: FROZEN FOOD	38.55	10685
302514	D4	20' CONTAINER GTCU2016543 STC: DRY FOOD	38.55	10106

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16
NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302516	D3	20' REEFER CONTAINER SUDU278276 STC: FROZEN FOODS	38.55	11122
302517	D4	20' REEFER CONTAINER SUDU1033796 STC: DRY FOOD	38.55	11468
302520	D4	20' REEFER CONTAINER SUDU1036012 STC: DRY FOOD	38.55	12825
302523	D4	20' CONTAINER TTNU-3887197 SEAL #200493 CAT PARTS INVENTORY	38.55	5499
302524	D3	20' REEFER CONTAINER SUDU1038078 STC: FROZEN FOOD	38.55	10270
302527	D4	20' REEFER CONTAINER SUDU1030708 STC: FROZEN FOOD	38.55	13412
302528	D4	20' CONTAINER XINU1005029 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	3819
302529	D3	20' REEFER CONTAINER #SUDU 103739-0 SEAL # 6685331 STC: FROZEN FOOD	38.55	9387
302531	D3	20' REEFER CONTAINER SUDU 1032399 SEAL# 6685339 STC: FROZEN FOOD	38.55	9609
302532	D3	20' REEFER CONTAINER SUDU-1033292 SEAL #6685343 FROZEN FOOD	38.55	9806
302533	LH2	40' OT CONTAINER HLXU 462072-1 SEAL #200499 STC: SPARE HEAVY EQUIPMENT PARTS	77.10	12822
302534	D4	20' CONTAINER UESU 231914-5 SEAL# 200495 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	8746
302537	D2	20' REEFER CONTAINER SUDU 103517-1 SEAL #6685329 STC: REFRIGERATED FOOD DO NOT FREEZE	38.55	9837
302538	D4	20' CONTAINER XINU100230-7 STC: BATTLEFIELD SHOP TOOLING	38.55	4138
302539	LH1	20' CONTAINER UESU222242-7 STC: SPARE HEAVY EQUPMENT PARTS	38.55	9981

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 5-Aug-16

NAVIRE / VESSEL : Rosaire Voy: 1 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302540	D3	20' CONTAINER ZIMU256690-6 STC: BATTLEFIELD SHOP TOOLING	38.55	4561
302541	D4	20' CONTAINER FSCU 771812-8 STC: LUMBER	38.55	8402
302542	D4	20' CONTAINER ZIMU 256907-9 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	7064
302547	LH1	20' CONTAINER ZIMU 2352340 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	5451
302548	LH1	20' CONTAINER UESU226248-2 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	4688
302550	D2	20' CONTAINER XXXU3655718 STC: AYR-FOIL A2A 96'x125' ROLL	38.55	2500
302551	LH1	20' CONTAINER UESU226396-1 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	10235
302552	D2	20' REEFER CONTAINER CMCU5203140 STC: REFRIGERATED FOOD DO NOT FREEZE	38.55	7743
302554	D3	20' REEFER CONTAINER SUDU1034154 STC: FROZEN FOOD	38.55	9192
302556	D4	20' REEFER CONTAINER GCEU2028636 STC: FROZEN FOOD	38.55	12279

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Les services maritimes inc.
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MANIFESTE DE NAVIRE - VESSEL MANIFEST

SOMMAIRE PAR EMPLACEMENT / LOCATION SUMMARY **NAVIRE / VESSEL :Rosaire Voy: 2** DATE: 13-Sep-16

DESTINATION: PORT				DESTINATION: MINE			
EMPLACEMENT LOCATION	QUANTITÉ QUANTITY	VOLUME (M^3)	POIDS WEIGHT (MT)	EMPLACEMENT LOCATION	QUANTITÉ QUANTITY	VOLUME (M^3)	POIDS WEIGHT (MT)
DECK 1	15	578.25	134.02	DECK 1	19	732.45	143.22
DECK 2	10	160.29	44.92	DECK 2	6	162.84	33.42
DECK 3	39	1633.20	328.18	DECK 3	42	1661.17	272.99
DECK 4	11	424.05	89.08	DECK 4	16	616.80	112.71
DECK TOTAL	75	2795.79	596.20	**DECK TOTAL**	83	3173.26	562.34
TWEEN DECK 1	41	839.59	177.64	TWEEN DECK 1	8	234.82	72.83
TWEEN DECK 2	10	1908.57	127.56	TWEEN DECK 2	1	2.98	1.37
TWEEN DECK 3	14	1305.80	112.32	TWEEN DECK 3	3	69.56	5.73
TWEEN DECK 4	0	0.00	0.00	TWEEN DECK 4	0	0.00	0.00
TWEEN TOTAL	65	4053.96	417.53	**TWEEN TOTAL**	12	307.36	79.93
LOWER HOLD 1	22	848.10	277.94	LOWER HOLD 1	11	424.05	133.41
LOWER HOLD 2	522	1514.61	873.16	LOWER HOLD 2	337	2020.56	1042.62
LOWER HOLD 3	50	1626.74	390.33	LOWER HOLD 3	38	501.11	183.28
LOWER HOLD 4	0	0.00	0.00	LOWER HOLD 4	0	0.00	0.00
LOWER HOLD TOTAL	594	3989.45	1541.43	**LOWER HOLD TOTAL**	386	2945.72	1359.30
TOTAL	734	10839.20	2555.15	**TOTAL**	481	6426.34	2001.57
				GRAND TOTAL	**1215**	**17265.54**	**4556.71**

PORT OF VALLEYFIELD ★ VALPORT Les services maritimes inc. Maritime Services Inc. ★ Valleyfield, Quebec, Canada

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE NAVIRE SOMMAIRE / VESSEL REPORT SUMMARY

NAVIRE / VESSEL :Rosaire Voy: 2 PORT DE CHARGEMENT / PORT OF LOADING: VALLEYFIELD

DATE: 13-Sep-16 PORT DE DÉCHARGEMENT / PORT OF DISCHARGE: MARY RIVER

TOTAUX DU CHARGEMENT / LOADING TOTALS

DESTINATION: PORT

QUANTITÉ QUANTITY	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (MT)
125	CONTENEUR / CONTAINERS	5831.51	1308.02
12	SURDIMENSIONNÉ / OVER-DIMENSIONAL	2588.00	172.21
3	MOBILE (0 - 10 MT)	79.76	12.96
2	MOBILE (10 - 50 MT)	157.99	35.49
1	MOBILE (50 - 100 MT)	90.78	9.50
581	MARCHANDISE GÉNÉRALE / GENERAL MERCHANDISE	1930.87	983.93
10	MATIÈRES DANGEREUSES / DANGEROUS GOODS	160.29	33.03

TOTAUX DU CHARGEMENT / LOADING TOTALS

DESTINATION: MINE

QUANTITÉ QUANTITY	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (MT)
146	CONTENEUR / CONTAINERS	5628.30	1343.22
0	SURDIMENSIONNÉ / OVER-DIMENSIONAL	0.00	0.00
0	MOBILE (0 - 10 MT)	0.00	0.00
0	MOBILE (10 - 50 MT)	0.00	0.00
0	MOBILE (50 - 100 MT)	0.00	0.00
330	MARCHANDISE GÉNÉRALE / GENERAL MERCHANDISE	673.75	625.48
5	MATIÈRES DANGEREUSES / DANGEROUS GOODS	124.29	32.87

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Les services maritimes inc.
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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT DAT! 13-Sep-16

NAVIRE / VESSEL : Rosaire Voy: 2

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
116863	D2	WOODEN CRATE STC: UN1075 PETROLEUM GASSES, CLASS 2.1 2 CYLINDERS x 18 KGS	77
116864	D2	WOODEN CRATE STC: UN1075 PETROLEUM GASES, CLASS 2.1 2 CYLINDERS x 45 KGS	230
116865	D2	WOODEN CRATE STC: □ -UN1950 AEROSOLS, CLASS 2.1 16 CANS WD-40 x 411 G EACH-UN1075 PETROLEUM GASES, CLASS 2.1 5 CYLINDERS x 400 G EACH	63
116890	D2	CRATE STC:□ -UN2259 TRIETHYLENETETRAMINE, CLASS 8□ 1 PALLET OF 42 PLASTIC DRUMS	465
116891	D2	CRATE STC:□ -UN1133 ADHESIVES, CLASS 3□ 12 PAILS x 18.9 LITRES	330
118380	D2	CRATE STC: □ UN1950, AEROSOLS, CLASS 2.2 (6.1)□ 192 FIBERBOARD BOXES NET 1731 KGS	1538
118382	D2	CRATE STC:□ UN1950, AEROSOLS, CLASS 2.2 (6.1)□ 46 FIBERBORAD BOXES NET 415 KGS	923
119006	D2	CRATE STC:□ -UN2259 TRIETHYLENETETRAMINE, CLASS 8□ 110 PLASTIC DRUMS	1251

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT DATI 13-Sep-16
NAVIRE / VESSEL : Rosaire Voy: 2

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
301037	D3	1 x 20' CONTAINER 240379-8 STC: □ -UN1950 6 x FIBERBOARD BOXES AEROSOL RECEPTACLES, CLASS 2.1, NET WT: 27.22 KGS	9173
301099	D3	20' CONTAINER 338790-8 STC:□ -UN3093 SODIUM NITRATE, CLASS 8(5.1)□ 1 x PLASTIC DRUM NET 20 LITRES□ -UN2800 BATTERIES, CLASS 8□ 2 PALLETS x 35 BOXES	5942
301100	D3	20' CONTAINER 157487-6 STC:□ -UN1500 SODIUM NITRATE, CLASS 5.1 (6.1)□ 40 PLASTIC BAGS NET 1,000 KGS	7286
301101	D3	20' CONTAINER 303062-0 STC:□ -UN1956 COMPRESSED GAS, CLASS 2.2□ 5 CYLINDERS x 15.77KGS□ -UN1072 OXYGEN COMPRESSED, CLASS 2.2(5.1)□ 45 CYLINDERS x 13.5 KGS□ -UN1066 NITROGEN, CLASS 2.2□ 50 CYLINDERS x 37 KGS/160 CYLINDERS x 21.8 KGS/24 CYLINDERS x 7.2 KGS/4 CYLINDERS x 7.4 KGS□ -UN1013 CARBON MONOXIDE, CLASS 2.2□ 30 CYLINDERS x 49.4 KGS	6511

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Maritime Services Inc.

MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT

DATI 13-Sep-16

NAVIRE / VESSEL : Rosaire Voy: 2

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
302587	D2	20' REEFER SUDU 1035398 STC:□ -UN1950 AEROSOLS, CLASS 2.1□ 20 FIBERBORAD BOXES □ -UN3262 CORROSIVE SOLID, CLASS 8□ 400 PLASTIC DRUMS□ -UN3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, CLASS 9□ 10 FIBERBOARD BOXES	8150
302588	D2	20' REEFER SUDU 103308-1 STC:□ -UN1823 SODIUM HYDROXIDE, CLASS 8□ 150 FIBERBOARD BOXES□ -UN3267 CORROSIVE LIQUID, BASIC ORGANIC□ 20 FIBERBOARD BOXES□ -UN2491 ETHANOLAMINE SOLUTION, CLASS 8□ 10 FIBERBOARD BOXES	13083

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT DATI 13-Sep-16
NAVIRE / VESSEL : Rosaire Voy: 2

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
302589	D2	20' REEFER 270465 STC:□ -UN1823 SODIUM HYDROXIDE, CLASS 8□ 100 FIBERBOARD BOXES□ -UN2491 EHTANOLOAMINE SOLUTION, CLASS 8□ 15 FIBERBOARD BOXES□ -UN3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, CLASS 9□ 4 FIBERBOARD BOXES□ -UN1169 EXTRACTS, AROMATIC, LIQUID, CLASS 3□ 4 FIBERBOARD BOXES□ -UN3262 CORROSIVE SOLID BASIC INORGANIC, CLASS 8□ 260 PLASTIC DRUMS□ -UN3267 CORROSIVE LIQUID, CLASS 8□ 10 FIBERBOARD BOXES□ -UN3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, CLASS 9□ 50 FIBERBORAD BOXES	11265

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DES MATIÈRES DANGEREUSES / DANGEROUS GOODS REPORT

DAT: 13-Sep-16

NAVIRE / VESSEL : Rosaire Voy: 2

PKG#	EMPLACEMENT LOCATION	DESCRIPTION M.D. DG DESCRIPTION	POIDS TOTAL TOTAL WEIGHT (KGS)
302621	LH3	20' CONTAINER NONU824484-0 STC:□ -UN1223 KEROSENE, CLASS 3 12 FIBERBOARD BOXES NET 90 KGS□ -UN1993 FLAMMABLE LIQUID, CLASS3 8 x 1L PLASTIC CONTAINERS NET 31.2 KGS□ -UN3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, CLASS 9 6 BOXES x 16 KGS/1 BOX x 10 KGS□ -UN3082 ENVIRNMENTALLY HAZARDOUS SUBSTANCE, CLASS 9 12 FIBERBOARD BOXES NET 133.2 KGS□ -UN1230 METHANOL, CLASS 3(6.1) 3 FIBERBOARD BOXES NET 21.4 KGS□ -UN1223 KEROSENE, CLASS 3 STEEL DRUM NET 208 KGS□ -UN1986 ALCOHOLS, FLAMMABLE, TOXIC, CLASS 3(6.1) 1 PLSTIC DRUM NET 208 KGS	6900

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 13-Sep-16
NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: PORT

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
114267	LH2	4 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 1 (BLUE/RED)	0.63	2370
114268	LH2	4 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 1 (BLUE/RED)	0.63	2370
114269	LH2	4 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 1 (BLUE/RED)	0.63	2370
114270	LH2	4 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 1 (BLUE/RED)	0.63	2370
114271	LH2	4 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 1 (BLUE/RED)	0.63	2370
114272	LH2	4 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 2 (VERT)	0.63	2370
114273	LH2	4 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 2 (BLUE/RED)	0.63	2370
114274	LH2	10 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 3/8 (BLUE/RED)	0.63	2223
114275	LH2	10 HOT ROLLED ALLOY PLATE(400F) 48 x 96 x 3/8 (BLUE/RED)	0.63	2223
114276	LH2	1 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (BLUE/RED)	0.36	445
114277	LH2	4 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (BLUE/RED)	0.54	1778
114278	LH2	5 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (YELLOW/RED)	0.60	2222
114280	LH2	16 HOT ROLL FLAT BARS 3/8 x 10 x 20'	0.24	1851
114289	LH2	40 HOT ROLLED STEEL SHEETS 48 x 96 x 0.120 (RED)	0.65	2177
114290	LH2	40 HOT ROLLED SHEETS 48 x 96 x 0.120 (RED)	0.65	2177
114291	LH2	40 HOT ROLLED SHEETS 48 x 96 x 0.120 (RED)	0.65	2177
114292	LH2	40 HOT ROLLED SHEETS 48 x 96 x 0.120 (RED)	0.65	2177
114293	LH2	13 HOT ROLLED PLATE (50W) 48 x 96 x 0.375 (BLUE)	0.89	2889
114295	LH2	8 HOT ROLLED PLATE (50W) 48 x 96 x 0.21 (BLUE)	0.63	1778
114296	LH2	9 HOT ROLLED PLATE (50W) 48 x 96 x 0.21 (BLUE)	0.63	1778
114297	LH2	6 HOT ROLLED PLATES (50W) 48 x 96 x 0.625 (BLUE)	0.65	2222
114298	LH2	2 HOT ROLLED PLATES (50W) 48 x 96 x 0.625 (BLUE)	0.65	740
114299	LH2	6 HOT ROLLED PLATES (50W) 48 x 96 x 0.625 (BLUE)	0.65	2220
114300	LH2	6 HOT ROLLED PLATES (50W) 48 x 96 x 0.625 (BLUE)	0.65	2220

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115316	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024767	7.68	329
115317	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024773	4.13	193
115318	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024774	4.70	224
115319	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024768	7.68	329
115320	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024763	7.68	329
115321	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024766	7.68	329
115322	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024762	7.68	329
115323	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024765	7.68	329
115324	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024764	7.68	329
115325	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024772	7.68	329
115326	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024759	7.68	329
115327	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024771	7.68	329
115328	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024761	7.68	329
115329	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024760	7.68	329
115330	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024770	7.68	329
115331	LH2	RIDGID INSULATION 2 x 24 X 96 CRATE NO: Y024802	9.18	1187
115332	LH2	PLYWOOD 3/4 x 4 x 8 & 1/2 x 4 x 8 & 5/8 x 4 x 8 (OSB) CRATE NO: Y024753	3.54	1823
115333	LH2	LUMBER 2 x 4 x 8 CRATE NO: Y024801	2.94	1187
115334	LH2	LUMBER 2 x 4 x 8 CRATE NO: Y024800	2.94	1187
115335	LH2	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024756	2.59	1352
115336	LH2	PLYWOOD 3/4 x 4 x 8 CRATE NO: Y024757	2.59	1222
115337	LH2	LUMBER 2 x 10 x 8 CRATE NO: Y024311	2.43	897
115338	LH2	PLYWOOD 1/4 x 4 x 4 CRATE NO: Y024754	2.74	1432

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115339	LH2	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024755	2.59	1352
115340	LH2	LUMBER 2 x 4 x 12 CRATE NO: Y024791	4.24	1791
115341	LH2	LUMBER 2 x 4 x 12 CRATE NO: Y024792	4.45	1829
115342	LH2	LUMBER 2 x 4 x 16 CRATE NO: Y024793	5.10	1884
115343	LH2	LUMBER 2 x 4 x 12 CRATE NO: Y024790	4.24	1791
115344	LH2	LUMBER 2 x 10 x 12 CRATE NO: Y024310	5.39	2217
115345	LH2	RIDGID INSULATION 2 x 24 x 96 CRATE NO: Y024769	7.68	329
115346	LH2	11 HOT ROLLED PLATES (50W) 48 x 96 x 0.250 (BLUE)	0.60	1630
115347	LH2	11 HOT ROLLED PLATES (50W) 48 x 96 x 0.250 (BLUE)	0.60	1630
115348	LH2	8 HOT ROLLED PLATES (50W) 48 x 96 x 0.250 (BLUE)	0.60	1185
115349	LH2	12 HOT ROLLED PLATES (50W) 48 x 96 x 0.188 (BLUE)	0.57	1334
115350	LH2	11 HOT ROLL PLATE 48X96X0.188 (BLUE)	0.67	1334
115352	LH2	3 HOT ROLL PLATE 48X96X1, 44W (GREEN)	0.63	1800
115353	LH2	3 HOT ROLL PLATE 48X96X1, 44W (GREEN)	0.63	1800
115354	LH2	3 HOT ROLL PLATE 48X96X1, 44W (GREEN)	0.63	1800
115355	LH2	3 HOT ROLL PLATE 48X96X1, 44W (GREEN)	0.63	1800
115356	LH2	3 HOT ROLL PLATE 48X96X1, 44W (GREEN)	0.63	1800
115357	LH2	3 HOT ROLL PLATE 48X96X1, 44W (GREEN)	0.63	1800
115358	LH2	2 HOT ROLL PLATE 48X96X1, 44W (GREEN)	0.54	1214
115359	LH2	10 HOT ROLL PLATE 48X96X1/4,Q&T100 (YELLOW /RED)	0.60	1556
115360	LH2	3 HOT ROLL PLATE 48X96X1 1/4,44W (GREEN)	0.68	2259
115361	LH2	3 HOT ROLLPLATE 48X96X1 1/4,44W (GREEN)	0.68	2259
115362	LH2	3 HOT ROLL PLATE 48X96X1 1/4,44W (GREEN)	0.68	2259
115363	LH2	3 HOT ROLL PLATE 48X96X1 1/4,44W (GREEN)	0.68	2259

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115364	LH2	2 HOT ROLL PLATE 48X96X1 1/4,44W (GREEN)	0.60	1501
115365	LH2	3 HOT ROLL PLATE 48X96X1 1/4,44W (GREEN)	0.68	2259
115366	LH2	2 HOT ROLL PLATE 48X96X1 1/4,44W (GREEN)	0.60	1501
115367	LH2	3 HOT ROLL PLATE 48X96X1 1/4,44W (GREEN)	0.68	2059
115368	LH2	3 HOT ROLL PLATE 48X96X1 1/4,44W (GREEN)	0.68	2259
115369	LH2	5 HOT ROLL PLATE 48X96X3/4, Q&T100(YELLOW/RED)	0.68	2309
115370	LH2	5 HOT ROLL PLATE 48X96X3/4, Q&T100(YELLOW/RED)	0.68	2309
115371	LH2	5 HOT ROLL PLATE 48X96X1/2, Q&T100(YELLOW/RED)	0.60	1534
115372	LH2	5 HOT ROLL PLATE 48X96X1/2, Q&T100(YELLOW/RED)	0.60	1534
115373	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W (GREEN)	0.68	2228
115374	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W (GREEN)	0.68	2228
115375	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W (GREEN)	0.68	2228
115376	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W (GREEN)	0.68	2228
115377	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W (GREEN)	0.68	2228
115378	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W (GREEN)	0.68	2228
115379	LH2	4 HOT ROLL PLATE 48X96X3/4, 44W (GREEN)	0.68	1782
115380	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W (GREEN)	0.68	2228
115381	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W	0.68	2228
115382	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W	0.68	2228
115383	LH2	5 HOT ROLL PLATE 48X96X3/4, 44W	0.68	2228
115384	LH2	HOT ROLL PLATE 49X96X7/8, 44W	0.63	2108
115385	LH2	HOT ROLL PLATE 49X96X7/8, 44W	2.98	2108
115386	LH2	2 HOT ROLL PLATE 49X96X7/8, 44W	0.51	1057
115387	LH2	4 HOT ROLL PLATE 48X96X1, 44W	0.68	2407

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115388	LH2	4 HOT ROLL PLATE 48X96X1, 44W	2.98	2407
115389	LH2	4 HOT ROLL PLATE 48X96X1, 44W	0.68	2407
115390	LH2	HOT ROLL PLATE 48X96X1, 44W	2.98	1808
115391	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115392	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115393	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115394	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115395	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115396	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115397	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115398	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115399	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115400	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115401	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115402	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115403	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.77	2963
115429	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1/2 (BLUE/RED)	0.57	1481
115430	LH2	6HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1/2 (BLUE/RED)	0.57	1771
115431	LH2	6 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1/2 (BLUE/RED)	0.57	1771
115432	LH2	6 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1/2 (BLUE/RED)	0.57	1771
115433	LH2	6 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1/2 (BLUE/RED)	0.57	1771
115434	LH2	6 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 1/2 (BLUE/RED)	0.57	1771
115435	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115436	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223

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115437	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115438	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115439	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115440	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115441	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115442	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115443	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115444	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115445	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115446	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115447	LH2	5 HOT ROLLED ALLOY PLATE (400F) 48 x 96 x 3/4 (BLUE/RED)	0.60	2223
115466	LH2	8 HOT ROLLED PLATE (50W) 48 x 96 x 0.23 (BLUE)	0.68	1778
115484	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.86	2666
115485	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.65	1923
115486	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.60	1478
115487	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.65	1923
115488	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.60	1478
115489	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.60	1478
115490	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.65	1923
115491	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.65	1923
115492	LH2	HOT ROLLED PLATES 48 x 96 x 1/4 (BLUE)	0.65	1923
115493	LH2	HOT ROLLED PLATES 48 x 96 x 3/8 (BLUE)	0.68	2223
115494	LH2	HOT ROLLED PLATES 48 x 96 x 3/8 (BLUE)	0.68	2223
115495	LH2	HOT ROLLED PLATES 48 x 96 x 3/8 (BLUE)	0.68	2223

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115496	LH2	HOT ROLLED PLATES 48 x 96 x 3/8 (BLUE)	0.68	2223
115497	LH2	HOT ROLLED PLATES 48 x 96 x 3/8 (BLUE)	0.68	2223
115498	LH2	HOT ROLLED PLATES 48 x 96 x 3/8 (BLUE)	0.68	2223
115499	LH2	HOT ROLLED PLATES 48 x 96 x 0.120 (ORANGE)	0.65	2227
115500	LH2	HOT ROLLED PLATES 48 x 96 x 0.120 (ORANGE)	0.65	2227
115501	LH2	HOT ROLLED PLATES 48 x 96 x 0.120 (ORANGE)	0.65	2227
115502	LH2	HOT ROLLED STEEL PLATE 48 x 96 x 0.120 (ORANGE)	0.65	2227
115503	LH2	8 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.63	1779
115504	LH2	8 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.63	1779
115505	LH2	8 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.63	1779
115506	LH2	8 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.63	1779
115507	LH2	8 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.63	1779
115508	LH2	8 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.63	1779
115509	LH2	8 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.63	1779
115510	LH2	7 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.60	1557
115511	LH2	7 HOT ROLL PLATE 48X96X3/8, 50W (BLUE SIDE)	0.60	1557
115512	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075
115513	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075
115514	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075
115515	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075
115516	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075
115517	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075
115518	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075
115519	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075

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115520	LH2	7 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.65	2075
115521	LH2	6 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.63	1779
115522	LH2	6 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.63	1779
115523	LH2	5 HOT ROLL PLATE 48X96X1/2, 50W (BLUE SIDE)	0.60	1483
115524	LH2	4 HOT ROLLED ALLOY PLATE 48X96X1 400F (RED/BLUE)	0.65	2371
115525	LH2	4 HOT ROLLED ALLOY PLATE 48X96X1 400F (RED/BLUE)	0.65	2371
115526	LH2	4 HOT ROLLED ALLOY PLATE 48X96X1 400F (RED/BLUE)	0.65	2371
115527	LH2	4 HOT ROLLED ALLOY PLATE 48X96X1 400F (RED/BLUE)	0.65	2371
115528	LH2	4 HOT ROLLED ALLOY PLATE 48X96X1 400F (RED/BLUE)	0.65	2371
115529	LH2	2 HOT ROLLED ALLOY PLATE 48X96X1 400F (RED/BLUE)	0.48	1186
115530	LH2	2 CHROMIUM CARBIDE OVERPLAY PLATE 60X120X3/8	0.71	695
115531	LH2	2 CHROMIUM CARBIDE OVERPLAY PLATE 60X120X3/8	0.70	695
115532	LH2	5 HOT ROLLED ALLOY PLATE 48X96X3/4 (RED/BLUE)	0.60	2223
115533	LH2	5 HOT ROLLED ALLOY PLATE 48X96X3/4 (RED/BLUE)	0.60	2223
115534	LH2	5 HOT ROLLED ALLOY PLATE 48X96X3/4 (RED/BLUE)	0.60	2223
115535	LH2	5 HOT ROLLED ALLOY PLATE 48X96X3/4 (RED/BLUE)	0.60	2223
115536	LH2	6 HOT ROLLED ALLOY PLATE 48X96X1/2 (RED/BLUE)	0.60	1778
115537	LH2	6 HOT ROLLED ALLOY PLATE 48X96X1/2 (RED/BLUE)	0.60	1778
115538	LH2	6 HOT ROLLED ALLOY PLATE 48X96X1/2 (RED/BLUE)	0.60	1778
115539	LH2	2 HOT ROLLED ALLOY PLATE 48X96X1/2 (RED/BLUE)	0.39	593
115573	LH2	DUNNAGE ROUGH, 6" x 6" x 10'	3.67	1872
115574	LH2	DUNNAGE ROUGH, 6" x 6" x 10'	3.67	1872
115575	LH2	DUNNAGE ROUGH, 6" x 6" x 10'	5.48	2532
115581	LH2	5 WEAR PLATES 48 x 96 x 1/2 + 1/8 (YELLOW)	1.07	1678

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115582	LH2	7 WEAR PLATES 48 x 96 x 1/2 + 1/8 (YELLOW)	1.43	2313
115583	LH2	7 WEAR PLATES 48 x 96 x 1/4 + 1/8 (YELLOW)	1.43	2313
115584	LH2	7 WEAR PLATES 48 x 96 x 1/4 + 1/8 (YELLOW)	1.43	2313
115585	LH2	7 WEAR PLATES 48 x 96 x 1/4 + 1/8 (YELLOW)	1.43	2313
115586	LH2	WEAR PLATES 48 x 96 x 1/4 + 1/8 (YELLOW)	1.34	1750
115587	LH2	WEAR PLATES 48 x 96 x 1/8 + 1/4 (BLUE)	1.34	1750
115588	LH2	WEAR PLATES 48 x 96 x 1/4 + 1/8 (YELLOW)	1.34	1750
115589	LH2	8 WEAR PLATES 48 x 96 x 1/4 + 1/8 (BLUE)	1.49	1989
115590	LH2	8 WEAR PLATES 48 x 96 x 1/4 + 1/8 (BLUE)	1.49	1989
115591	LH2	8 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	1.04	1065
115592	LH2	8 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	0.99	1065
115593	LH2	8 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	1.04	1065
115594	LH2	8 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	1.04	1065
115595	LH2	12 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	0.93	1596
115596	LH2	12 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	1.35	1596
115597	LH2	12 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	1.35	1596
115598	LH2	12 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	0.93	1596
115599	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.51	1241
115600	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.51	1241
115601	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.51	1241
115602	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.48	1241
115603	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.51	1241
115604	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.48	1241
115605	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.48	1241

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115606	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.48	1241
115607	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.48	1241
115608	LH2	6 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	1.58	1241
115609	LH2	3 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.250 x 24'	0.98	620
115610	LH2	20 HOT ROLLED ANGLES 1 x 1 x 1/8	0.06	145
115611	LH2	44 HOT ROLLED ANGLES 1 1/2 x 1 1/2 x 1/8	0.26	490
115612	LH2	46 HOT ROLLED ANGLES 1 1/2 x 1 1/2 x 1/4	0.23	976
115613	LH2	45 HOT ROLLED ANGLES 2 x 2 x 1/8	0.25	674
115614	LH2	45 HOT ROLLED ANGLES 2 1/2 x 2 1/2 x 1/4	0.37	2315
115615	LH2	35 HOT ROLLEDANGLES 2 x 2 x 3/8	0.46	1492
115616	LH2	80 HOT ROLLEDANGLES 2 x 2 x 1/4	0.41	1674
115617	LH2	35 HOT ROLLEDANGLES 3 x 3 x 1/4	0.56	1556
115618	LH2	20 HOT ROLLEDANGLES 3 x 3 x 3/8	0.22	1306
115619	LH2	20 HOT ROLLEDANGLES 3 x 3 x 1/2	0.41	1705
115620	LH2	20 HOT ROLLEDANGLES 3 x 3 x 1/2	0.41	1705
115621	LH2	HOT ROLL BANDS MIXED	0.20	640
115622	LH2	HOT ROLL FLAT BARS MIXED	0.22	696
115623	LH2	15 HOT ROLL FLAT BARS 1/2 x 1 1/2 x 20'	0.08	347
115624	LH2	150 HOT ROLL FLAT BARS 1/4 x 2 x 20'	0.42	2314
115625	LH2	90 HOT ROLL FLAT BARS 1/4 x 2 x 20'	0.45	1388
115626	LH2	40 HOT ROLL FLAT BARS 3/8 x 4 x 20'	0.34	1851
115627	LH2	90 HOT ROLL FLAT BARS 3/8 x 2 x 20'	0.36	2082
115628	LH2	HOT ROLL FLAT BARS MIXED	0.24	811
115629	LH2	20 HOT ROLL FLAT BARS 1/2 x 5 x 20'	0.22	1542

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115630	LH2	HOT ROLL FLAT BARS MIXED	0.18	984
115631	LH2	60 HOT ROLL FLAT BARS 1/4 x 3 x 20'	0.30	1388
115632	LH2	40 HOT ROLL FLAT BARS 3/8 x 3 x 20'	0.37	1390
115633	LH2	37 HOT ROLL FLAT BARS 1/4 x 4 x 20'	0.16	1142
115635	LH2	HOT ROLL FLAT BARS MIXED	0.23	948
115636	LH2	HOT ROLL FLAT BARS MIXED	0.13	485
115637	LH2	50 HOT ROLLED ROUND BARS 5/8 x 44 x 20'	0.46	1211
115638	LH2	HOT ROLLED ROUND BARS MIXED	0.46	970
115639	LH2	HOT ROLLED ROUND BARS MIXED	0.58	1504
115640	LH2	WELDED BLACK STEEL PIPES 2 EA 3/4 x 21' & 1 x 21'	3.42	54
115641	LH2	6 WIDE FLANGE BEAM STRUCTURAL 8 x 10 x 20'	0.83	544
115642	LH2	6 WIDE FLANGE BEAM STRUCTURAL 8 x 10 x 20'	0.83	544
115643	LH2	1 WIDE FLANGE BEAM STRUCTURAL 8 x 10 x 20'	0.28	90
115644	LH2	6 WIDE FLANGE BEAM STRUCTURAL 6 x 15 x 20'	0.91	816
115645	LH2	7 WIDE FLANGE BEAM STRUCTURAL 6 x 15 x 20'	1.06	953
115646	LH2	10 HOT ROLL CHANNEL 2 x 9/16 x 3/16	0.34	169
115647	LH2	3 WIDE FLANGE BEAMS 18 x 60 x 20'	1.55	1633
115648	LH2	3 WIDE FLANGE BEAMS 18 x 60 x 20'	1.55	1633
115649	LH2	3 WIDE FLANGE BEAMS 18 x 60 x 20'	1.58	1633
115650	LH2	1 WIDE FLANGE BEAM 18 x 60 x 20'	0.90	544
115651	LH2	HOT ROLL FLAT BAR 1/4 x 10 x 20'	0.29	2159
115659	LH2	10 HOLLOW STRUCTURAL RECTANGLE 3 x 1 x .188 x 24'	0.30	470
115660	LH2	6 HOLLOW STRUCTURAL RECTANGLE 10 x 4 x .250 x 24'	1.67	1464
115661	LH2	35 HOLLOW STRUCTURAL SQUARE1 1/2 x 1 1/2 x .250 x 24'	0.84	1556

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115662	LH2	25 HOLLOW STRUCTURAL SQUARE1 1/2 x 1 1/2 x .250 x 24'	0.63	1111
115663	LH2	32 HOLLOW STRUCTURAL SQUARE1 1/2 x 1 1/2 x .250 x 24'	0.64	1422
115664	LH2	32 HOLLOW STRUCTURAL SQUARE1 1/2 x 1 1/2 x .250 x 24'	0.64	1422
115665	LH2	5 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.375 x 24'	1.52	1814
115666	LH2	5 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.375 x 24'	1.62	1814
115667	LH2	9 HOLLOW STRUCTURAL RECTANGLE 6 x 3 x 0.250 x 24'	1.21	1364
115668	LH2	9 HOLLOW STRUCTURAL RECTANGLE 6 x 3 x 0.250 x 24'	1.21	1364
115669	LH2	8 HOLLOW STRUCTURAL RECTANGLE 6 x 3 x 0.250 x 24'	0.97	1212
115670	LH2	10 HOLLOW STRUCTURAL SQUARE 3 x 3 x 0.188 x 24'	0.84	750
115671	LH2	10 HOLLOW STRUCTURAL SQUARE 2 x 2 x 0.250 x 24'	0.08	235
115672	LH2	10 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250 x 24'	1.26	1029
115673	LH2	10 HOLLOW STRUCTURAL RECTANGLE 4 x 2 x 0.250 x 24'	0.75	1151
115674	LH2	6 HOLLOW STRUCTURAL RECTANGLE 4 x 2 x 0.250 x 24'	0.45	576
115675	LH2	12 HOLLOW STRUCTURAL RECTANGLE 4 x 2 x 0.250 x 24'	0.77	622
115676	LH2	2 HOLLOW STRUCTURAL RECTANGLE 4 x 2 x 0.250 x 24'	0.08	192
115677	LH2	6 HOLLOW STRUCTURAL RECTANGLE 4 x 2 x 0.125 x 24'	0.43	310
115680	LH2	30 STRUCTURAL ANGLE 3 x 3 x 3/8 x 20'	0.55	1960
115681	LH2	10 ROLLED ANGLE 2 1/2 x 2 1/2 x 3/8 x 20'	0.20	535
115682	LH2	20 ROLLED ANGLE 2 1/2 x 2 1/2 x 1/4 x 20'	0.27	744
115683	LH2	55 ROLLED ANGLE 2 x 2 x 3/8 x 20'	0.58	2345
115684	LH2	10 STURCTURAL ANGLE 4 x 4 x 1/4 x 20'	0.32	599
115685	LH2	45 STRUCTURAL ANGLE 3 x 3 x 1/4 x 20'	0.44	2000
115686	LH2	25 STRUCTURAL ANGLE 3 x 3 x 3/8 x 20'	0.49	1633
115687	LH2	6 STRUCTURAL ANGLE 4 x 4 x 3/8 x 20'	0.22	534

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115688	LH2	6 STRUCTURAL ANGLE 6 x 6 x 5/16 x 20'	0.25	675
115689	LH2	50 ROLLED ANGLED 2 x 2 x 1/4 x 20'	0.35	1451
115690	LH2	2 ROLLED ANGLED 2 x 2 x 1/4 x 20'	0.03	58
115691	LH2	50 ROLLED ANGLED 2 x 2 x 1/4 x 20'	0.35	1451
115692	LH2	49 ROLLED ANGLED 2 x 2 x 1/4 x 20'	0.35	1422
115693	LH2	49 ROLLED ANGLED 2 x 2 x 1/4 x 20'	0.35	1422
115694	LH2	20 ROLLED ANGLED 3 x 3 x 1/4 x 20'	0.30	889
115695	LH2	4 STRUCTURAL ANGLE 6 x 6 x 3/4 x 20'	0.23	541
115696	LH2	HOT ROLL PLATE 48 x 96 x 1/4	0.27	445
115697	LH2	12 HOT ROLL PLATE 48 x 96 x 3/16	0.45	1334
115698	LH2	12 HOT ROLL PLATE 48 x 96 x 3/16	0.45	1334
115699	LH2	6 HOT ROLL PLATE 48 x 96 x 1/2	0.39	1779
115700	LH2	6 HOT ROLL PLATE 48 x 96 x 1/2	0.39	1779
115701	LH2	6 HOT ROLL PLATE 48 x 96 x 1/2	0.39	1779
115702	LH2	6 HOT ROLL PLATE 48 x 96 x 1/2	0.39	1779
115703	LH2	6 HOT ROLL PLATE 48 x 96 x 1/2	0.39	1779
115704	LH2	5 HOT ROLL PLATE 48 x 96 x 1/2	0.30	1482
115705	LH2	5 HOT ROLL PLATE 48 x 96 x 1/2	0.30	1482
115706	LH2	5 HOT ROLL PLATE 48 x 96 x 1/2	0.30	1482
115707	LH2	5 HOT ROLL PLATE 48 x 96 x 1/2	0.30	1482
115708	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.45	2223
115709	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.45	2223
115710	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.45	2223
115711	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.45	2223

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115712	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.45	2223
115713	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.45	2223
115714	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.45	2223
115715	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.36	1852
115716	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.36	1852
115717	LH2	5 WIDE FLANGE BEAMS 12 x 40 x 20'	1.76	1814
115718	LH2	5 WIDE FLANGE BEAMS 12 x 40 x 20'	1.76	1814
115719	LH2	5 WIDE FLANGE BEAMS 18 x 60 x 20'	1.59	1633
115720	LH2	3 WIDE FLANGE BEAMS 18 x 60 x 20'	1.62	1633
115721	LH2	4 WIDE FLANGE BEAMS 18 x 60 x 20'	1.89	2177
115722	LH2	13 STRUCTURAL CHANNELS 6 x 10.5 x 20'	0.61	1238
115723	LH2	13 STRUCTURAL CHANNELS 4 x 6.25 x 20'	0.30	737
115724	LH2	13 STRUCTURAL CHANNELS 4 x 6.25 x 20'	0.30	737
115725	LH2	18 COLD FINISHED SQUARE BAR MIXED	0.05	260
115726	LH2	8 STRUCTURAL CHANNEL 8 x 18.75 x 20'	0.44	1361
115727	LH2	8 STRUCTURAL CHANNEL 8 x 18.75 x 20'	0.44	1361
115728	LH2	16 STRUCTURAL CHANNEL 6 x 4 x 5/16 x 20'	0.66	1495
115729	LH2	10 STRUCTURAL CHANNEL 6 x 8.2 x 20'	0.43	744
115730	LH2	13 STRUCTURAL CHANNEL 6 x 10.5 x 20'	0.61	1238
115731	LH2	16 WELDED BLACK STEEL PIPE MIXED	0.46	489
115732	LH2	10 STRUCTURAL CHANNEL 5 x 9 x 20'	0.34	816
115733	LH2	10 HOT ROLLE ANGLE 4 x 5.4 x 20'	0.32	490
115734	LH2	10 HOT ROLLED ANGLE 1/2 x 1/2 x 1/8 x 20' & 12 STRUCTURAL CHANNEL 5 x 6.7 x 20'	0.07	156

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115735	LH2	10 STRUCTURAL CHANNEL 3 x 4.1 x 20'	0.21	372
115736	LH2	12 STRUCTURAL CHANNEL 3 x 5 x 20'	0.24	544
115737	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250	0.72	1474
115738	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250	0.74	1474
115739	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250	0.72	1474
115740	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250	0.72	1474
115741	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250	0.72	1474
115742	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250	0.72	1474
115743	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250	0.72	1474
115744	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250	0.72	1474
115745	LH2	8 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250	0.99	1063
115746	LH2	12 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.250	0.98	1595
115747	LH2	20 HOLLOW STRUCTURAL SQUARE 3 x 3 x 0.250	1.16	1914
115748	LH2	15 HOLLOW STRUCTURAL SQUARE 3 x 3 x 0.250	1.03	1436
115749	LH2	15 HOLLOW STRUCTURAL SQUARE 3 x 3 x 0.250	0.86	1436
115750	LH2	9 HOLLOW STRUCTURAL SQUARE 4 x 4 x .250	0.98	1197
115751	LH2	65 HOLLOW STRUCTURAL SQUARE 1 x x .125	0.57	955
115752	LH2	475 HOLLOW STRUCTURAL SQUARE 1 1/2 x 1 1/2 x .250	0.79	1994
115753	LH2	5 HOLLOW STRUCTURAL SQUARE 3 x 3 x 0.375	0.60	662
115754	LH2	22 ROLL FLAT BAR 1/4 x 6 x 20'	0.15	1018
115755	LH2	30 ROLL ANGLE 1 x 1 x 1/8 x 20'	0.05	218
115756	LH2	5 ROLL FLAT BAR 1/2 x 6 x 20'	0.06	463
115757	LH2	17 ROLLED ANGLE 1 x 1 x 1/4 x 20'	0.07	230
115758	LH2	14 ROLL FLAT BAR 3/8 x 6 x 20'	0.13	972

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115759	LH2	48 ROLL FLAT BAR 1/4 x 6 x 20'	0.30	2221
115760	LH2	27 ROLL FLAT BAR 1/4 x 10 x 20'	0.26	2082
115761	LH2	26 ROLL FLAT BAR 3/8 x 6 x 20'	0.27	1804
115762	LH2	10 ROLL FLAT BAR 1/2 x 10 x 20'	0.21	1542
115763	LH2	20 ROLLED ANGLE 1/2 x 1/2 x 1/4	0.10	425
115764	LH2	100 ROLLED ANGLE 2 x 2 x 1/8	0.54	1497
115765	LH2	20 ROLLED ANGLE 1/2 x 1/2 x 1/8	0.07	223
115780	LH2	4 ALUMINUM PLATE 1/4 x 48 x 96 & 2 EXPANDED FLAT HR SHEET 1/2 x 48 x 96	0.40	245
115781	LH2	8 EXPANDED FLAT HR SHEET 3/4 x 48 x 96	0.74	88
115784	LH2	2 EXPANDED FLAT SHEET 1/2 - 13F & 4 ALUMINUM PLATE 48 x 96 x 0.250	0.74	245
115785	LH2	8 EXPANDED FLAT HR SHEET 3/4 - 13F	0.37	88
115791	LH2	9 WIDE FLANGE BEAMS STRUCTURAL 6 x 15 x 20	1.28	1225
115792	LH2	9 WIDE FLANGE BEAMS STRUCTURAL 6 x 15 x 20	1.28	1225
115793	LH2	8 WIDE FLANGE BEAMS STRUCTURAL 6 x 15 x 20	0.79	1088
115794	LH2	8 WIDE FLANGE BEAMS STRUCTURAL 6 x 15 x 20	1.05	1088
115795	LH2	8 WIDE FLANGE BEAMS STRUCTURAL 6 x 15 x 20	1.05	1088
115796	LH2	8 WIDE FLANGE BEAMS STRUCTURAL 6 x 15 x 20	1.05	1088
115797	LH2	14WIDE FLANGE BEAMS STRUCTURAL 8 x 10 x 20	1.44	1270
115798	LH2	14WIDE FLANGE BEAMS STRUCTURAL 8 x 10 x 20	1.42	1270
115799	LH2	11 WIDE FLANGE BEAMS STRUCTURAL 8 x 10 x 20	1.31	998
115800	LH2	11 WIDE FLANGE BEAMS STRUCTURAL 8 x 10 x 20	1.31	998
116301	LH2	5 ROLLED ROUND BAR2" HR ROUND 44 W x 20'	0.09	484

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M³)	POIDS WEIGHT (KGS)
116302	LH2	35 ROLLED ROUND BAR 7/8" HR ROUND 44W x 20'	0.11	648
116303	LH2	13 STRUCTURAL CHANNEL 4 x 6.25 x 20'	0.21	737
116304	LH2	10 STRUCTURAL CHANNEL 5 x 9 x 20'	0.18	816
116305	LH2	25 ROLL STRUCTURAL ANGLE 4 x 4 x 3/8 x 20'	0.51	2223
116306	LH2	22 ROLL STRUCTURAL ANGLE 4 x 4 x 3/8 x 20'	0.51	1956
116307	LH2	ROLLED ROUND BAR MIXED	0.20	641
116308	LH2	ROLLED ROUND BAR 3/4" HR ROUND 44W x 20'	0.21	748
116309	LH2	12 STURCTURAL CHANNEL 3 x 5 x 20'	0.27	544
116310	LH2	13 STURCTURAL CHANNEL 4 x 6.25 x 20'	0.20	737
116311	LH2	13 STURCTURAL CHANNEL 6 x 10.5 x 20'	0.54	1238
116312	LH2	HOLLOW STRUCTURAL SQUARE + ROLL FLAT BAR MIXED	0.33	505
116313	LH2	13 STRUCTURAL CHANNEL 6 x 10.5 x 20'	0.54	1238
116314	LH2	2 STRUCTURAL 5 x 6.7 x 20' & 10 STRUCTURAL CHANNEL 4 x 5.4	0.34	608
116315	LH2	10 STRUCTURAL CHANNEL 3 x 4.1 x 20'	0.20	372
116316	LH2	8 STRUCTURAL CHANNEL 8 x 18.75 x 20'	0.42	1361
116317	LH2	8 STRUCTURAL CHANNEL 8 x 18.75 x 20'	0.42	1361
116318	LH2	10 STRUCTURAL CHANNEL 6 x 8.2 x 20'	0.46	744
116319	LH2	50 ROLLED ROUND BAR 1" HR ROUND 44W x 20'	0.31	1211
116320	LH2	23 ROLL STRUCTURAL ANGLE 5 x 5 x 5/16 x 20'	0.68	2149
116321	LH2	16 ROLL STRUCTURAL ANGLE 6 x 4 x 5/16 x 20'	0.32	1495
116322	LH2	14 ROLL STRUCTURAL ANGLE 6 x 4 x 1/2 x 20'	0.52	1626
116350	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116351	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116352	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116353	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116354	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116355	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116356	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116357	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116358	LH2	2 GOOD YEAR TIRES 35/65R33	8.16	2126
116396	LH2	14 HOT ROLL PLATE 48 x 96 x 1/4	0.42	2096
116397	LH2	14 HOT ROLL PLATE 48 x 96 x 1/4	0.42	2096
116398	LH2	14 HOT ROLL PLATE 48x 96 x 1/4	0.42	2096
116399	LH2	14 HOT ROLL PLATE 48 x 96 x 1/4	0.42	2096
116400	LH2	14 HOT ROLL PLATE 48 x 96 x 1/4	0.42	2096
116401	LH2	14 HOT ROLL PLATE 48 x 96 x 1/4	0.42	2096
116402	LH2	10 HOT ROLL PLATE 48 x 96 x 3/8	0.51	2222
116403	LH2	10 HOT ROLL PLATE 48x 96 x 3/8	0.51	2222
116404	LH2	6 HOT ROLL PLATE 48 x 96 x 3/8	0.39	1334
116405	LH2	6 HOT ROLL PLATE 48 x 96 x 1/2	0.39	1779
116406	LH2	7 HOT ROLL PLATE 48x 96 x 1/2	0.42	2075
116407	LH2	1 HOT ROLL PLATE 48 x 96 x 1/2	0.27	296
116408	LH2	6 HOT ROLL PLATE 48x 96 x 1/2	0.39	1779
116409	LH2	5 HOT ROLL PLATE 48 x 96 x 1/2	0.36	1482
116410	LH2	6 HOT ROLL PLATE 48x 96 x 1/2	0.39	1775
116411	LH2	5 HOT ROLL PLATE 48 x 96 x 1/2	0.36	1482
116412	LH2	4 HOT ROLL PLATE 48 x 96 x 1/2	0.30	1185
116413	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.57	2223

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116414	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.57	2223
116415	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.57	2223
116416	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.57	2223
116417	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.45	1934
116418	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.45	1934
116419	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.45	1934
116420	LH2	6 HOT ROLL PLATE 48 x 96 x 5/8	0.57	1934
116421	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.57	1934
116422	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.57	1934
116423	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.57	1934
116424	LH2	5 HOT ROLL PLATE 48 x 96 x 5/8	0.57	1934
116468	LH2	10 HOT ROLL CHANNEL 2 x 9/16 x 3/16 x 20'	0.06	169
116469	LH2	4 COLD FINISHED PRECISION GROUND MIXED	0.20	847
116470	LH2	4 COLD FINISHED PRECISION GROUND MIXED	0.44	1588
116471	LH2	16 HOT ROLL PLATE ALLOY 2 x 1.25 x 20'	0.33	1235
116472	LH2	8 HOT ROLL PLATE ALLOY 2 x 2 x 20'	0.12	987
116473	LH2	16 HOT ROLL PLATE ALLOY 2 x 2 x 20'	0.27	1974
116474	LH2	10 HOT ROLL PLATE ALLOY 2 x 3 x 20'	0.23	1852
116475	LH2	4 HOT ROLL PLATE ALLOY 2 x 4 x 20'	0.13	989
116476	LH2	6 HOT ROLL PLATE ALLOY 2 x 4 x 20'	0.20	1483
116525	LH2	3 WIDE FLANGE BEAMS STRUCTURAL 12 x 40 x 20'	1.09	1089
116526	LH2	3 WIDE FLANGE BEAMS STRUCTURAL 12 x 40 x 20'	1.09	1089
116527	LH2	3 WIDE FLANGE BEAMS STRUCTURAL 12 x 40 x 20'	1.09	1089
116528	LH2	1 WIDE FLANGE BEAMS STRUCTURAL 12 x 40 x 20'	0.62	363

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116565	TD3	16 CULVERT PIPE 500MM X 1.6 MM X 9 M GALV.	41.58	3100
116566	TD3	16 CULVERT PIPE 500MM X 1.6 MM X 9 M GALV.	41.58	3100
116570	TD3	16 CULVERT 500 MM X 1.6 MM X 9 M GALV.	41.58	3100
116571	TD3	16 CULVERT 500 MM X 1.6 MM X 9 M GALV.	41.58	3100
116572	TD1	CULVERTS	36.00	3506
116573	TD1	CULVERTS	36.00	3506
116574	TD1	CULVERTS	36.00	3506
116575	TD1	CULVERTS	36.00	3506
116576	TD1	CULVERTS	36.00	3506
116577	TD1	CULVERTS	36.00	3506
116578	TD1	CULVERTS	36.00	3506
116579	TD1	CULVERTS	36.00	3506
116582	TD1	3 CULVERTS	53.58	7013
116583	TD1	3 CULVERTS	53.58	7013
116584	D3	12 CULVERTS	53.58	14610
116585	D3	12 CULVERTS	53.58	14610
116587	D3	12 CULVERTS	53.58	14609
116588	D3	12 CULVERTS	53.58	14609
116591	TD1	12 CULVERTS	53.58	14609
116592	D3	12 CULVERTS	53.58	14609
116619	TD1	OPEN CRATE STC: CULVERT COUPLERS	4.26	1590
116620	TD1	OPEN CRATE STC: CULVERT COUPLERS	11.74	2552
116621	TD1	OPEN CRATE STC: CULVERT COUPLERS	5.52	1998
116631	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116632	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399
116633	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399
116634	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399
116635	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399
116636	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399
116637	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399
116638	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399
116639	LH3	TIRE 2700 R49 2 x RM-4A + 4SL	5.67	1399
116645	LH3	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116646	TD1	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116647	TD1	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116648	LH3	TIRE 2700R49 2X RM-4A+ 4SL	5.67	1399
116674	LH2	STEEL GRATING	1.42	1827
116675	LH2	STEEL GRATING	1.42	1827
116698	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116704	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116705	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116706	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116707	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116708	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116709	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116710	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116711	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116712	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116713	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116714	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116715	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116716	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116717	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116718	TD1	TIRE 14.00 R25NH3 TYPE 25	0.69	186
116723	LH2	HOSES	9.00	3176
116749	LH2	PALLET STC: ARCO PLATE 20/11 X 50 X 120	1.04	1945
116750	LH2	PALLET STC: ARCO PLATE 20/11 X 50 X 120	1.04	1945
116775	LH3	BUNDLE OF PVC PIPES 1"	2.10	534
116776	LH3	BUNDLE OF PVC PIPES 6" (MIXED)	6.84	964
116777	LH3	BUNDLE OF STEEL PIPES 4" (10)	1.17	1427
116778	LH3	BUNDLE OF STEEL PIPES 4" (10)	1.17	1427
116779	LH3	BUNDLE OF STEEL PIPES 4" (10)	1.17	1427
116780	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.17	1427
116781	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.17	1427
116782	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.17	1427
116783	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.30	1361
116784	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.30	1361
116785	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.30	1361
116797	LH2	CRATE WITH DOORS FOR ORE TRAILER	15.05	2423
116834	TD3	DRILL ON TRACKS	64.84	12247
116835	D3	GT 3000 PINOTH CARRIER S/N 906300988	93.15	23247

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116836	TD3	F250 4 x 4 UPER DUTY USED PICK UP (WLDING MACHINE + PLASTIC TOTE IN BACK)	26.40	5670
116837	TD3	F350 4 x 4 UPER DUTY USED PICK UP #509-50(TANK + PLASTIC TOTE + FIRE EXTINGUISHER IN BACK)	35.64	5670
116838	TD2	CAMP SHACK # 1 (77304)	239.19	14741
116839	TD2	CAMP SHACK # 2 (77303)	248.73	14940
116840	TD3	CAMP SHACK # 3 (77300)	234.62	13520
116841	TD3	CAMP SHACK # 4 (77302)	224.56	17022
116842	TD2	CAMP SHACK # 5 (77306)	222.88	14288
116843	TD2	CAMP SHACK # 6 (77307)	113.46	20865
116844	TD2	CAMP SHACK # 7 (77308)	230.56	12247
116845	TD2	CAMP SHACK # 8 (77311)	247.44	13520
116846	TD2	CAMP SHACK # 9 (77309)	237.33	14606
116847	TD3	CAMP SHACK # 10 (77301)	229.89	14606
116848	TD2	CAMP SHACK # 11 (77305)	223.56	13520
116849	TD2	CAMP SHACK # 12 (77310)	135.78	8337
116850	LH2	RIG MAT	2.28	1134
116851	LH2	RIG MAT	2.28	1134
116852	LH2	RIG MAT	2.28	1134
116853	LH2	RIG MAT	2.28	1134
116854	LH2	RIG MAT	2.28	1134
116855	LH2	RIG MAT	2.28	1134
116856	TD3	277C SKID STEER (BOBCAT)	17.72	1620
116857	TD3	950 H WHEELED LOADER	90.78	9502

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116862	LH2	GREY PLAT FORM (SKID PALTE)	31.47	4717
116863	D2	WOODEN CRATE STC: PETROLEUM GASES	0.31	77
116864	D2	WOODEN CRATE STC: PETROLEUM GASES	0.82	230
116865	D2	WOODEN CRATE STC: AEROSOLS & PETROLEUM GASES	0.38	63
116866	LH2	CRATE (TANK INSIDE)	4.63	726
116867	LH2	CRATE (TANK INSIDE)	4.63	816
116868	LH2	CRATE (TANK INSIDE)	4.63	816
116881	LH2	SKID STC: DAY CAB S14422	12.75	658
116882	TD3	LARGE TANK ON SKID	212.89	19323
116883	LH3	LONG PIECE	2.07	227
116884	LH2	JAW DIE	0.89	2800
116885	LH2	PUMP	12.17	1915
116886	TD3	HOOK FOR LOADER	2.14	740
116887	LH2	WOODEN CRATE	1.52	769
116888	LH2	WOODEN CRATE	2.76	1394
116889	LH2	RHEEL OF CABLE	2.94	3906
116890	D2	CRATE STC: DANGEROUS GOODS	0.27	465
116891	D2	CRATE STC: ADHESIVES - DANGEROUS GOODS	1.06	330
116892	LH2	PLASTIC ROOFING MEMBRANE	1.36	1152
116893	LH2	PLASTIC ROOFING MEMBRANE	1.36	1047
116894	LH2	PLASTIC ROOFING MEMBRANE	1.36	1052
116895	LH2	PLASTIC ROOFING MEMBRANE	1.36	1052
116896	LH2	PLASTIC ROOFING MEMBRANE	1.36	1160
116897	LH2	PLASTIC ROOFING MEMBRANE	1.60	1330

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116898	LH2	PLASTIC ROOFING MEMBRANE	1.60	1230
116900	TD2	TOWER LIGHT	9.64	500
117478	LH2	CRATE STC: WEST WORLD TRUCK PARTS	2.20	1443
118516	LH3	TRACK 20FT 30 X 32 X 1.5	0.44	484
118517	LH2	CRATE STC: ACCESSORIES FOR THE TRACK (#118516)	0.34	67
118777	LH2	WOOD	1.86	1437
118778	LH2	WOOD	2.40	1756
118804	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118805	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118806	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118807	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118808	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118809	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118810	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118811	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118812	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118813	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118814	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118815	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118816	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118835	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118836	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118837	LH2	PALLET WITH 4 DRUMS (SPIRAX S6 ATF A295)	1.37	804
118838	LH2	PALLET WITH 2 DRUMS (SPIRAX S6 ATF A295)	1.37	603

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
118925	LH2	CONVEYOR BELT	1.84	822
118927	LH2	SWING JAWS	0.55	1295
118928	LH2	SWING JAWS	0.55	1295
118929	LH2	SWING JAWS	0.55	1295
118930	LH2	SWING JAWS	0.55	1295
118931	LH2	SWING JAWS	0.55	1295
118932	LH2	SWING JAWS	0.55	1295
118933	LH2	SWING JAWS	0.55	1295
118934	LH2	SWING JAWS	0.55	1295
118935	LH2	2 SKIDS STC: SMALL PLATE	0.31	900
119006	D2	CRATE STC: DANGEROUS GOODS	3.25	1251
119007	LH2	PALLET WITH 1 DRUM (OMALA/SPIRAX)	0.21	204
300350	D3	20' CONTAINER 351428-2 STC: CARLO CHAIRS BLACK & ORANGE	38.55	3295
300416	D4	20' CONTAINER 300821-8 STC: TRAXON E SYNTHETIC 75W-90	38.55	9486
300417	D4	20' CONTAINER 238028-3 STC: SYNDURO SHB 32 & ARDEE 32 LUBRICATION 205L DRUMS	38.55	9486
300437	D3	20' CONTAINER 737587-1 STC: MATTRESSES	38.55	3320
300449	TD1	20' CONTAINER 230380-5 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12200
300460	LH3	20' CONTAINER #258401-3 SEAL # 2971529 STC: DURON-E SYNTHETIC	38.55	11880
300468	D3	20' CONTAINER 291590-8 STC: MIXED CARGO	38.55	18974
300472	LH3	20' CONTAINER 303665-2 STC: DURON-E SYNTHETIC 4W-40 1040	38.55	12050
300473	D3	20' CONTAINER 351095-0 STC: MIXED CARGO	38.55	9380

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300477	D3	20' CONTAINER 239706-0 STC: MIXED CARGO	38.55	6586
300478	LH3	20' CONTAINER 257244-5 STC: MIXED CARGO	38.55	11306
300495	D4	20' CONTAINER 118179-1 STC: PRECISION XL 5 MOLY (4 BARRELS/SKID)	38.55	9868
300497	LH3	20' CONTAINER 274706-0 STC: DURON E-SYNTHETIC 5W-40 1040	38.55	12000
300499	TD1	20' CONTAINER 286891-4 STC: 10 TOTE BAGS 100 KGS - CALCIUM CHLORIDE XTRA 85%	38.55	12300
300500	LH1	20' CONTAINER 768700-6 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE XTRA85%	38.55	12220
301001	LH1	20' CONTAINER 152360-0 STC: 10 TOTE BAGS 1000KGS - CALCIUM CHLORIDE XTRA85%	38.55	12220
301002	LH1	20' CONTAINER 238779-3 STC: 10 TOTE BAGS 1000KGS - CALCIUM CHLORIDE XTRA85%	38.55	12300
301003	TD1	20' CONTAINER 214096-7 STC: 10 TOTE BAGS 1000KGS - CALCIUM CHLORIDE XTRA85%	38.55	12220
301004	LH1	20' CONTAINER 296714-4 STC: 10 TOTE BAGS 1000KGS - CALCIUM CHLORIDE XTRA85%	38.55	12220
301005	TD1	20' CONTAINER 177849-5 STC: 10 TOTE BAGS 1000KGS - CALCIUM CHLORIDE XTRA85%	38.55	12250
301006	LH1	20' CONTAINER 240401-1 STC: HYDREX EXTREME 1040L IBC	38.55	11545
301007	LH1	20' CONTAINER 325844-1 STC: HYDREX EXTREME 1040L IBC	38.55	11620
301008	LH1	20' CONTAINER 310745-0 STC: MIXED CARGO	38.55	11508
301009	D2	20' CONTAINER 159246-3 STC: OFFICE SUPPLIES & FILTERS	38.55	4545
301012	LH1	20' CONTAINER 231836-9 STC: BRAKE PARTS	38.55	13200

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M³)	POIDS WEIGHT (KGS)
301013	D3	20' CONTAINER 231617-2 STC: INDUSTRIAL HEATERS & TRUCK PARTS	38.55	5659
301018	D3	20' CONTAINER 353919-3 STC: PALLETS OF EMPTY BAGS	38.55	8000
301021	LH1	20' CONTAINER 130136-7 STC: DIESEL EXHAUST FLUID	38.55	16560
301022	LH1	20' CONTAINER 120722-1 STC: DIESEL EXHAUST FLUID	38.55	16560
301023	D3	20' CONTAINER 386180-1 STC: ENDURATEX SYNTHETIC EP 150	38.55	9851
301024	D3	20' CONTAINER 348589-9 STC: SAFETY EQUIPMENT	38.55	3961
301025	LH3	20' CONTAINER 126412-9 STC: DIESEL EXHAUST FLUID	38.55	12800
301026	D3	20' CONTAINER 337639-6 STC: MIXED CARGO	38.55	4261
301027	LH3	40' CONTAINER 436954-7 STC: 142 TIRES 325/95R24	77.10	15366
301028	LH1	20' CONTAINER 270859-9 STC: MIXED CARGO	38.55	12290
301030	TD1	20' CONTAINER 350557-3 STC: HYDREX EXTREME 1040L IBC	38.55	11985
301031	TD1	20' CONTAINER 395315-5 STC: HYDREX EXTREME 1040L IBC & PRODURO TO-4 + SYN ALL SEASON	38.55	12020
301032	TD1	20' CONTAINER 301833-2 STC: HYDRES EXTREME 1040L IBC	38.55	12030
301033	TD1	20' CONTAINER 168121-0 STC: HYDREX EXTREME 1040L IBC	38.55	12020
301034	LH3	40' CONTAINER 438452-0 STC: 157 TIRES 325/95R24 GOODYEAR OMN MSD II 162/160K M+S	77.10	16593
301041	LH3	40' CONTAINER 432247-3 STC: 150 TIRES 325/95R24 GOODYEAR OMN MSD II 162/160K M+S	77.10	16023
301043	LH3	40' CONTAINER 429436-6 STC: 158 TIRES 325/95R24 GOODYEAR OMN MSD II 162/160K M+S	77.10	16680
301045	TD1	20' CONTAINER 306640-7 STC: HYDREX EXTREME 1040L IBC	38.55	12020
301047	D3	20' CONTAINER 300845-5 STC: MIXED CARGO	38.55	4914

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
301049	D4	20' CONTAINER 380205-9 STC: MIXED CARGO	38.55	6821
301050	LH1	20' CONTAINER 220116-7 STC: HYDREX EXTREME 1040L IBC	38.55	12100
301051	LH3	40' CONTAINER 437272-5 STC: 166 TIRES 325/95R24 GOODYEAR OMN MSD II 162/160K M+S	77.10	17337
301052	LH3	40' CONTAINER 437985-9 STC: 167 TIRES 325/95R24 GOODYEAR OMN MSD II 162/160K M+S	77.10	17419
301054	LH3	40' CONTAINER 435804-9 STC: 166 TIRES 325/95R24 GOODYEAR OMN MSD II 162/160K M+S	77.10	17337
301055	D3	20' CONTAINER 239004-4 STC: MIXED CARGO	38.55	4227
301056	D3	20' CONTAINER 338504-2 STC: TOROMONT CARGO FOR AIRPORT	38.55	6252
301057	D3	20' CONTAINER TGHU271755-4 STC: TOROMONT CARGO FOR AIRPORT	38.55	7974
301061	LH3	20' CONTAINER 373992-4 STC: HYDREX EXTREME 1040L IBC & PRODURO TO -4+ SYN ALL SEASON	38.55	12040
301062	LH3	20' CONTAINER 243321-0 STC: PRECISION XL 5 MOLY & ENDURATEX SYNTHETIC EP 150	38.55	10315
301063	D3	20' CONTAINER 299063-0 STC: INDUSTRIAL HEATERS & ORANGE PICKETS ON SKIDS	38.55	4540
301067	LH3	40' CONTAINER 436075-0 STC: 165 TIRES 325/95R24 GOODYEAR OMN MSD II 162/160K M+S	77.10	17255
301068	D3	20' CONTAINER 769405-2 STC: MIXED CARGO	38.55	5443
301070	LH1	20' CONTAINER 163259-2 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE	38.55	12390

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
301071	LH1	20' CONTAINER 310552-3 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE	38.55	12160
301072	LH1	20' CONTAINER 157777-2 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE	38.55	12340
301073	LH1	20' CONTAINER 190548-1 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE	38.55	12230
301074	LH1	20' CONTAINER 184877-6 STC: 10 TOTE BAGS 1000KGS - CALCIUM CHLORIDE	38.55	12200
301075	LH1	20' CONTAINER 205796-0 STC: HYDREX EXTREME 1040L IBC	38.55	12010
301076	LH3	20' CONTAINER 107716-5 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE	38.55	12390
301077	LH3	20' CONTAINER 137603-7 STC: 10 TOTE BAGS 1000KGS - CALCIUM CHLORIDE	38.55	12390
301079	D3	20' CONTAINER 221589-6 STC: MIXED CARGO	38.55	9247
301091	LH1	20' CONTAINER 235817-1 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE	38.55	12250
301092	LH1	20' CONTAINER 394802-0 STC: MIXED CARGO	38.55	13423
301094	D4	20' CONTAINER 235581-6 STC: TOROMONT CARGO FOR AIRPORT	38.55	7274
301095	LH1	20' CONTAINER 150276-8 STC: 10 TOTE BAGS 1000 KGS - CALCIUM CHLORIDE	38.55	12340
301096	LH1	20' CONTAINER 231127-7 STC: 10 TOTE ABGS 1000 KGS - CALCIUM CHLORIDE	38.55	12250
301099	D3	20' CONTAINER 338790-8 STC: CLASS 8 - DANGEROUS GOODS	38.55	5942

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301100	D3	20' CONTAINER 157487-6 STC: MIXED cargo + DANGEROUS GOODS	38.55	7286
301101	D3	20' CONTAINER 303062-0 STC: DANGEROUS GOODS	38.55	6511
301106	D3	20' CONTAINER 137588-4 STC: DRUMS OMALA/SPIRAX	38.55	9466
301107	D3	20' CONTAINER 114056-0 STC: PRECISION XL 5 MOLY & ENDURATEX SYNTHETIC EP150	38.55	10270
301109	LH3	40' CONTAINER 411985-1 STC: 150 TIRES 325/95R24 HC S ON/OFF DRIVE 18J ARMY NS	77.10	16023
301110	D3	20' CONTAINER 257348-5 STC: MIXED CARGO	38.55	8016
301113	D3	20' CONTAINER 250591-5 STC: MIXED CARGO	38.55	4780
301114	LH3	20' CONTAINER 797314-7 STC: MIXED CARGO	38.55	9093
301116	LH3	20' CONTAINER 151802-3 STC: TOROMONT CARGO FOR AIRPORT	38.55	6832
301118	LH3	40' CONTAINER 628738-5 STC: 132 TIRES 325/95R24 HC S ON/OFF DRIVE 18J ARMY NS	77.10	16023
301123	LH3	40' CONTAINER 619014-2 STC: 103 TIRES 325/95R24 & 22 TIRES 325/95R24	77.10	15918
301130	LH3	40' CONTAINER 123840-1 STC: 128 TIRES 325/95R24	77.10	16023
301133	LH3	40' CONTAINER 110554-3 STC: 146 TIRES 325/95R24	77.10	15968
301134	LH3	40' CONTAINER 123664-6 STC: 146 TIRES 325/95R24	77.10	16128
301135	D4	20' CONTAINER 120979-6 STC: TRUCK SUSPENSION PARTS	38.55	18105
301136	LH2	40' CONTAINER 111100-0 STC: 70 TIRES 385/65/R22.5 & 8 TIRES 50/115/10 & 62 TIRES 1200/R24	77.10	15968
301137	D4	20' CONTAINER 116558-0 STC: MIXED CARGO	38.55	10130

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301139	D3	20' CONTAINER 119924-0 STC: MIXED CARGO	38.55	6553
301141	LH2	40' CONTAINER 424204-3 STC: 75G STEEL OVERPACK DRUMS	77.10	8520
301143	D3	20' CONTAINER #234390-5 SEAL #4220991 STC: 56 X 75 G STEEL OVERPACK DRUMS	38.55	4602
301144	D3	20' CONTAINER #122344-9 SEAL # 4221062 STC: 55 X 75G STEEL OVERPACK DRUMS	38.55	4540
301146	D3	20' CONTAINER # 257258 SEAL # 4221069 STC: TRUCKS PIECES AND BRAKEDRUM SKID	38.55	12415
301148	D3	20' CONTAINER 686681-9 STC: TOROMONT CARGO FOR AIRPORT	38.55	13524
301150	D2	20' CONTAINER 011686-0 STC: MIXED CARGO	38.55	12611
301151	D3	20' CONTAINER 272509-8 STC: AIRPORT CARGO	38.55	4114
301153	D1	20' CONTAINER 283087-6 STC: MIXED CARGO	38.55	7445
301154	D1	20' CONTAINER 247067-5(PORT/MINE) STC: MIXED CARGO	38.55	12133
301155	D1	20' CONTAINER 301441-6 STC: MIXED CARGO	38.55	8819
301157	D1	20' CONTAINER 282913-0 STC: TOROMONT CARGO FOR AIRPORT	38.55	8846
301158	D1	20' CONTAINER 351283-6 (PORT/MINE) STC: MIXED CARGO	38.55	10225
301159	D1	20' CONTAINER 274491-0 STC: MIXED AIRPORT CARGO	38.55	7889
301160	D2	20' CONTAINER 225966-3 STC: AIRPORT MIXED CARGO	38.55	14083
301161	D1	20' CONTAINER 201607-6 STC: AIRPORT CARGO MIXED	38.55	10180
301162	D1	20' CONTAINER 238666-1 STC: AIRPORT MIXED CARGO	38.55	9523
301163	D1	20' CONTAINER 254037-3(PORT/MINE) STC: MIXED CARGO	38.55	11141
301164	D1	20' CONTAINER 005274-1 STC: AIRPORT CARGO MIXED	38.55	8819

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M³)	POIDS WEIGHT (KGS)
301165	D1	20' CONTAINER 338348-2(PORT/MINE) STC: MANTLES & AIRPORT CARGO	38.55	8759
302511	D4	20' CONTAINER GTCU2016013 STC: DRY FOOD	38.55	4435
302560	D4	20' CONTAINER FSCU760205-6 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	5881
302561	LH2	20' CONTAINER UESU2263175 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	11787
302562	LH2	20' CONTAINER UESU2322508 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	9252
302565	D1	20' CONTAINER FSCU7717749 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	7323
302589	D2	20' REEFER CONTAINER 270465 STC: REFRIGERATED FOOD DO NOT FREEZE (DANGEROUS GOODS)	38.55	11265
302590	D3	20' CONTAINER GTCU201649-8 STC: DRY FOOD	38.55	5932
302604	D3	20' REEFER CONTAINER SUDU103326-6 STC: FROZEN FOOD	38.55	7609
302610	D1	20' CONTAINER GTCU201624-5 STC: (PORT/MINE) SHELF STABLE MILK DO NOT FREEZE	38.55	7290
302618	D1	20' CONTAINER NONU806819-1 STC: MIXED CARGO	38.55	7698
302619	D1	20' CONTAINER NONU833414 STC: MIXED CARGO	38.55	7930
302620	D4	20' CONTAINER NONU184432-9 STC: MIXED CARGO	38.55	4369
302621	LH3	20' CONTAINER NONU824484-0 STC: DANGEROUS GOODS + MIXED CARGO	38.55	6900
302622	LH2	40' CONTAINER ALRU711037-5	112.88	9531
302623	LH2	40' CONTAINER ALRU711051-8	137.19	13390

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302624	LH2	40' CONTAINER ALRU711076-0	112.88	6967
302625	LH2	40' CONTAINER ALRU711066-8	112.88	9160
302626	LH2	40' CONTAINER ALRU711042-0	112.88	9502
302629	D3	20' CONTAINER TGCU00147622G1	38.55	4445
302630	D4	20' CONTAINER GESU312043-1 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	3220

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
114224	LH2	LUMBER 2 x 4 x 8 CRATE NO: Y024816	2.18	741
114225	LH2	LUMBER 2 x 4 x 8 CRATE NO: Y024814	2.89	1091
114226	LH2	LUMBER 2 x 4 x 8 CRATE NO: Y024812	2.89	1091
114227	LH2	LUMBER 2 x 4 x 8 CRATE NO: Y024811	2.89	1091
114228	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024804	4.29	1756
114229	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024803	4.29	1756
114231	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024806	4.29	1756
114232	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024807	4.33	1756
114233	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024815	4.37	1934
114234	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024809	4.33	1756
114235	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024810	4.33	1756
114236	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024805	4.33	1756
114237	LH2	LUMBER 2 x 6 x 12 CRATE NO: Y024808	4.33	1756
114238	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114239	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114240	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114241	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114242	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114243	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114244	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114245	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114246	LH2	3 HOT ROLL PLATE 4X8X1 1/4, 44W (GREEN)	0.63	2264
114247	LH2	3 HOT ROLL PLATE 4X8X1 1/4, 44W (GREEN)	0.63	2264
114248	LH2	3 HOT ROLL PLATE 4X8X1 1/4, 44W (GREEN)	0.63	2264

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
114249	LH2	3 HOT ROLL PLATE 4X8X1 1/4, 44W (GREEN)	0.63	2264
114250	LH2	3 HOT ROLL PLATE 4X8X1 1/4, 44W (GREEN)	0.63	2264
114251	LH2	3 HOT ROLL PLATE 4X8X1 1/4, 44W (GREEN)	0.63	2264
114252	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114253	LH2	2 HOT ROLL PLATE 4X8X2, 44W (GREEN)	0.63	2417
114254	LH2	2 HOT ROLL PLATE 4X8X1 1/4, 44W (GREEN)	0.60	1520
114255	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114256	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114257	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114258	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114259	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114260	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114261	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114262	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114263	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114264	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114265	LH2	LUMBER, 2" x 6" x 16'	5.72	2337
114266	LH2	LUMBER, 2" x 6" x 16' / 2" x 6" x 16'	2.58	970
114281	LH2	11 HOT ROLL FLAT BAR 3/8 x 10 x 20'	0.17	1272
114282	LH2	13 HOLLOW STRUCTURAL RETANGLE 4 x 2 x .250 x 24'	0.79	2493
114283	LH2	13 HOLLOW STRUCTURAL RETANGLE 4 x 2 x .250 x 24'	0.78	2493
114284	LH2	6 HOLLOW STRUCTURAL RETANGLE 4 x 2 x 0.250 x 24'	0.34	576
114285	LH2	13 WIDE FLANGE BEAMS 6 x 15 x 20'	1.79	1700
114286	LH2	13 WIDE FLANGE BEAMS 6 x 15 x 20'	1.79	1700

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
114287	LH2	12 WIDE FLANGE BEAMS 6 x 15 x 20'	1.55	1633
114288	LH2	12 WIDE FLANGE BEAMS 6 x 15 x 20'	1.55	1633
115302	LH2	PLYWOOD 1/2 x 4 x 8 / 3/4 x 4 x 8 CRATE NO: Y024752	1.91	923
115303	LH2	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024741	2.65	1303
115304	LH2	PLYWOOD 3/4 x 4 x 8 CRATE NO: Y024748	2.62	1274
115305	LH2	PLYWOOD 3/4 x 4 x 8 CRATE NO: Y024747	2.62	1274
115306	LH2	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024745	2.65	1303
115307	LH2	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024744	2.65	1303
115308	LH2	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024742	2.62	1303
115309	LH2	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024740	2.65	1303
115310	LH2	PLYWOOD ASPENITE 5/8 x 4 x 8 CRATE NO: Y024751	3.04	1721
115311	LH2	PLYWOOD 3/4 x 4 x 8 CRATE NO: Y024750	2.62	1274
115313	LH2	PLYWOOD 1/2 x 4 x 8 CRATE NO: Y024743	2.65	1303
115314	LH2	LUMBER 2 x 4 x 12 CRATE NO: Y024796	1.80	711
115315	LH2	LUMBER 2 x 4 x 12 CRATE NO: Y024795	4.25	1438
115407	LH2	6 HOT ROLL PLATE (400F) 48 x 96 x 1/2 (RED/BLUE)	0.54	1841
115408	LH2	6 HOT ROLL PLATE (400F) 48 x 96 x 1/2 (RED/BLUE)	0.54	1841
115409	LH2	6 HOT ROLL PLATE (400F) 48 x 96 x 1/2 (RED/BLUE)	0.54	1841
115410	LH2	6 HOT ROLL PLATE (400F) 48 x 96 x 1/2 (RED/BLUE)	0.54	1841
115411	LH2	6 HOT ROLL PLATE (400F) 48 x 96 x 1/2 (RED/BLUE)	0.54	1841
115412	LH2	6 HOT ROLL PLATE (400F) 48 x 96 x 1/2 (RED/BLUE)	0.54	1841
115413	LH2	6 HOT ROLL PLATE (400F) 48 x 96 x 1/2 (RED/BLUE)	0.54	1841
115414	LH2	2 HOT ROLL PLATE (400F) 48 x 96 x 1/2 (RED/BLUE)	0.42	632
115415	LH2	2 HOT ROLL PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.48	225

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115416	LH2	4 HOT ROLL PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.65	2145
115417	LH2	4 HOT ROLLED ALLOY PLATE (400F) 48X96X1 (BLUE/RED)	0.48	1185
115418	LH2	4 HOT ROLLED ALLOY PLATE (400F) 48X96X3/4 (BLUE/RED)	0.54	1778
115419	LH2	4 HOT ROLLED ALLOY PLATE (400F) 48X96X3/4 (BLUE/RED)	0.54	1778
115420	LH2	4 HOT ROLLED ALLOY PLATE (400F) 48X96X3/4 (BLUE/RED)	0.54	1778
115421	LH2	6 HOT ROLLED PLATE 48X96X1/2 (YELLOW/RED)	0.57	1777
115422	LH2	6 HOT ROLL PLATE 48X96X1/3 (YELLOW/RED)	0.57	1777
115423	LH2	5 HOT ROLL PLATE (Q&T100) 48 x 96 x 1/2 (YELLOW/RED)	0.57	1535
115424	LH2	12 HOT ROLL PLATE (Q&T100) 48 x 96 x 1/4 (YELLOW/RED)	0.57	1881
115425	LH2	13 HOT ROLL PLATE (Q&T100) 48 x 96 x 1/4 (YELLOW/RED)	0.60	2034
115426	LH2	5 HOT ROLL PLATE (Q&T100) 48 x 96 x 3/4 (YELLOW/RED)	0.63	2314
115427	LH2	5 HOT ROLL PLATE (Q&T100) 48 x 96 x 3/4 (YELLOW/RED)	0.63	2314
115428	LH2	5 HOT ROLL PLATE (Q&T100) 48 x 96 x 3/4 (YELLOW/RED)	0.63	2314
115448	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115449	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115450	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115451	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115452	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115453	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115454	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115455	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115456	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115457	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.63	2264
115458	LH2	3 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (BLUE/RED)	0.54	1378

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115459	LH2	4 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1 (BLUE/RED)	0.65	2420
115460	LH2	4 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1 (BLUE/RED)	0.65	2420
115461	LH2	4 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1 (BLUE/RED)	0.65	2420
115462	LH2	4 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1 (BLUE/RED)	0.65	2420
115463	LH2	4 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1 (BLUE/RED)	0.65	2420
115464	LH2	4 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1 (BLUE/RED)	0.65	2420
115465	LH2	1 HOT ROLLED ALOY PLATE (400F) 48 x 96 x 1 (BLUE/RED)	0.65	659
115467	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270
115468	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270
115469	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270
115470	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270
115471	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270
115472	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270
115473	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270
115474	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270
115475	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.68	2407
115476	LH2	HOT ROLL PLATE 44W 48X96X1 (GREEN)	0.68	2407
115477	LH2	HOT ROLL PLATE 44W 48X96X1 (GREEN)	0.68	2407
115478	LH2	HOT ROLL PLATE 44W 48X96X1 (GREEN)	0.68	2407
115479	LH2	HOT ROLL PLATE 44W 48X96X1 (GREEN)	0.68	2407
115480	LH2	HOT ROLL PLATE 44W 48X96X1 (GREEN)	0.68	2407
115481	LH2	HOT ROLL PLATE 44W 48X96X1 (GREEN)	0.68	2407
115482	LH2	HOT ROLL PLATE 44W 48X96X1 (GREEN)	0.48	810
115483	LH2	HOT ROLL PLATE 44W 48X96X3/4 (GREEN)	0.65	2270

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115540	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (RED/BLUE)	0.65	2223
115541	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (RED/BLUE)	0.65	2223
115542	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (RED/BLUE)	0.65	2223
115543	LH2	5 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 3/4 (RED/BLUE)	0.65	2223
115544	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115545	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115546	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115547	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115548	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115549	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115550	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115551	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115552	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115553	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115554	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115555	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115556	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115557	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115558	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115559	LH2	6 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.57	1777
115560	LH2	4 HOT ROLLED ALLOY PLATES (400F) 48 x 96 x 1/2 (RED/BLUE)	0.45	1185
115634	LH2	9 HOT ROLL FLAT BARS 3/8 x 10 x 20'	0.15	1041
115652	LH2	15 HOLLOW STRUCTURAL SWUARE 3 x 3 x.250 x 24'	1.00	1436
115653	LH2	15 HOLLOW STRUCTURAL SWUARE 3 x 3 x.250 x 24'	1.00	1436

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
115654	LH2	15 HOLLOW STRUCTURAL SWUARE 3 x 3 x.250 x 24'	1.00	1436
115655	LH2	15 HOLLOW STRUCTURAL SWUARE 3 x 3 x.250 x 24'	1.00	1436
115656	LH2	15 HOLLOW STRUCTURAL SWUARE 3 x 3 x.250 x 24'	1.04	1436
115657	LH2	14 HOLLOW STRUCTURAL SWUARE 3 x 3 x.250 x 24'	1.00	1340
115658	LH2	10 HOLLOW STRUCTURAL SWUARE 3 x 3 x.250 x 24'	0.82	957
115766	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115767	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115768	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115769	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115770	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115771	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115772	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115773	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115774	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115775	LH2	10 HOT ROLLED ALLOY PLATE 48 x 96 x 3/4 (RED + BLUE)	0.60	2223
115778	LH2	15 EXPANDED FLAT HR SHEET 3/4 x 48 x 96 & 15 EXPANDED FLAT HR SHEET 1/2 x 48 x 96	0.80	291
115779	LH2	25 EXPANDED SHEET HR SHEET 1 x 48 x 96	0.45	217
116323	LH2	30 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250 x 24'	1.19	1769
116324	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250 x 24'	0.72	1475
116325	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250 x 24'	0.74	1475
116326	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250 x 24'	0.72	1475
116327	LH2	25 HOLLOW STRUCTURAL SQUARE 2 x 2 x .250 x 24'	0.72	1475
116328	LH2	82 HOLLOW STRUCTURAL SQUARE 1 x 1 x .125 x 24'	0.82	1205

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116329	LH2	26 HOLLOW STRUCTURAL SQUARE 1 1/2 x 1 1/2 x .250 x 24'	0.61	1152
116330	LH2	45 ROLL FLAT BAR 1/4 x 6 x 44W x 20'	0.32	2082
116331	LH2	16 ROLL FLAT BAR 3/4 x 4 x 44W x 20'	0.20	1481
116332	LH2	24 ROLL FLAT BAR 3/4 x 4 x 44W x 20'	0.30	2221
116333	LH2	12 ROLL FLAT BAR 3/4 x 6 x 44W x 20'	0.23	1666
116334	LH2	90 ROLL FLAT BAR 1/4 x 2 x 44W x 20'	0.29	1388
116335	LH2	20 ROLL FLAT BAR 1/4 x 10 x 44W x 20'	0.20	1542
116336	LH2	40 ROLL FLAT BAR 3/8 x 4 x 44W x 20'	0.28	1851
116337	LH2	57 ROLL FLAT BAR 1/4 x 3 x 44W x 20'	0.18	1319
116338	LH2	36 ROLL FLAT BAR 1/2 x 2 1/2 x 44W x 20'	0.19	1388
116339	LH2	20 ROLL FLAT BAR 3/8 x 5 x 44W x 20'	0.15	1158
116340	LH2	17 ROLL FLAT BAR 1 x 2 1/2 x 44W x 20'	0.26	1310
116341	LH2	17 ROLL FLAT BAR 1/4 x 1 1/2 x 44W x 20'	0.11	395
116342	LH2	10 ROLL FLAT BAR 1/2 x 5 x 44W x 20'	0.10	771
116343	LH2	30 ROLL FLAT BAR 1/2 x 5 x 44W x 20'	0.29	2313
116344	LH2	7 ROLL FLAT BAR & ROLL BAND MIXED	0.15	949
116345	LH2	ROLL FLAT BAR & ROLL BAND MIXED	0.22	1007
116346	LH2	ROLL FLAT BAR & ROLL BAND MIXED	0.26	1132
116347	LH2	38 ROLL FLAT BAR 3/8 x 2 1/2 x 44W x 20'	0.32	1100
116348	LH2	57ROLL FLAT BAR 3/8 x 2 x 44W x 20'	0.29	1319
116349	LH2	70 ROLL FLAT BAR 1/4 x 2 1/2 x 44W x 20'	0.22	1353
116364	LH2	3 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.54	17777
116365	LH2	4 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.54	17777
116366	LH2	4 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.68	2370

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116367	LH2	4 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.68	2370
116368	LH2	4 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.68	2370
116369	LH2	4 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.68	2370
116370	LH2	4 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.68	2370
116371	LH2	4 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.68	2370
116378	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116379	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116380	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116381	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116382	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116383	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116384	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116385	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116386	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116387	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116388	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116389	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116390	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116391	LH2	5 ROLLED ALLOY PLATE 4 x 8 x 3/4 (RED/BLUE)	0.65	2223
116394	LH2	4 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.65	2370
116395	LH2	1 ROLLED ALLOY PLATE 4 x 8 x 1 (RED/BLUE)	0.39	592
116452	LH2	4 COLD FINISHED SQUARE BARS MIXED	0.34	1588
116453	LH2	4 COLD FINISHED SQUARE BARS MIXED	0.23	847
116454	LH2	16 WELDED BLACK STEEL PIPES MIXED	0.51	466

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116455	LH2	9 HOLLOW STRUCTURAL RECTANGLE 6 x 3 x .250 x 24'	1.21	1363
116456	LH2	6 HOLLOW STRUCTURAL RECTANGLE 4 x 2 x .125 x 24'	0.43	311
116457	LH2	6 HOLLOW STRUCTURAL RECTANGLE 3 x 1 x .188 x 24'	0.30	470
116458	LH2	10 HOT ROLLED ANGLE 1/2 x 1/2 x 1/8	0.01	35
116459	LH2	18 COLD FINISHED SQUARE BAR MIXED	0.07	259
116460	LH2	9 HOLLOW STRUCTURAL RECTANGLE 6 x 3 x .250 x 24'	1.21	1363
116461	LH2	8 HOLLOW STRUCTURAL RECTANGLE 6 x 3 x .250 x 24'	0.98	1212
116462	LH2	6 HOLLOW STRUCTURAL RECTANGLE 10 x 4 x .250 x 24'	1.64	1464
116463	LH2	4 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.375 x 24'	1.00	1197
116464	LH2	2 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.375 x 24'	0.64	599
116465	LH2	4 HOLLOW STRUCTURAL SQUARE 6 x 6 x 0.375 x 24'	1.00	1197
116466	LH2	10 HOLLOW STRUCTURAL SQUARE 3 x 3 x 0.188 x 24'	0.80	750
116467	LH2	10 HOLLOW STRUCTURAL SQUARE 4 x 4 x 0.188 x 24'	1.24	1029
116477	LH2	16 HOT ROLL PLATE ALLOY 2 x 1.25 x 20'	0.29	1235
116478	LH2	8 HOT ROLL PLATE ALLOY 2 x 2 x 20'	0.14	988
116479	LH2	16 HOT ROLL PLATE ALLOY 2 x 2 x 20'	0.27	1975
116480	LH2	10 HOT ROLL PLATE ALLOY 2 x 3 x 20'	0.24	1852
116481	LH2	6 HOT ROLL PLATE ALLOY 2 x 4 x 20'	0.18	989
116482	LH2	4 HOT ROLL PLATE ALLOY 2 x 4 x 20'	0.12	1483
116483	LH2	12 WIDE FLANGE BEAMS STRUCTURAL 8 x 10 x 20'	1.28	1089
116484	LH2	12 WIDE FLANGE BEAMS STRUCTURAL 8 x 10 x 20'	1.26	1089
116485	LH2	13 WIDE FLANGE BEAMS STRUCTURAL 8 x 10 x 20'	1.47	1179
116486	LH2	13 WIDE FLANGE BEAMS STRUCTURAL 8 x 10 x 20'	1.44	1179
116498	LH3	REEL OF CABLE	4.72	1727

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M³)	POIDS WEIGHT (KGS)
116499	LH3	REEL OF CABLE	4.72	2566
116500	LH3	REEL OF CABLE	4.72	2880
116722	LH2	HOSES	7.76	2722
116751	D3	1 TRUCK CHASSIS	80.62	9100
116786	LH3	BUNDLE OF PVC PIPES 1"	2.10	534
116787	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.29	1361
116788	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.29	1361
116789	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.29	1361
116790	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.29	1361
116791	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.29	1361
116792	LH3	BUNDLE OF STEEL PIPES 6" (5)	1.29	1361
116793	LH3	BUNDLE OF PVC PIPES 6" (MIXED)	6.84	964
116794	LH3	BUNDLE OF STEEL PIPES 4" (10)	1.17	1427
116795	LH3	BUNDLE OF STEEL PIPES 4" (10)	1.17	1427
116796	LH3	BUNDLE OF STEEL PIPES 4" (10)	1.17	1427
116798	LH2	CRATE WITH DOORS FOR ORE TRAILER	15.05	2423
116799	LH2	4 GARBAGE BINS + 10 DOORS	50.56	4540
116800	LH2	6 GARBAGE BINS	66.91	6810
116801	LH2	DRILL STEMS C/W TOOL JOINTS # 92001193	0.15	612
116802	LH2	DRILL STEMS C/W TOOL JOINTS # 92001193	0.15	612
116803	LH2	DRILL STEMS C/W TOOL JOINTS # 92001193	0.15	612
116804	LH2	DRILL STEMS C/W TOOL JOINTS # 92001193	0.15	612
116805	LH2	DRILL STEMS C/W TOOL JOINTS # 92001193	0.15	612
116806	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116807	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116808	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116809	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116810	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116811	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116812	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116813	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116814	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116815	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116816	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116817	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116818	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116819	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116820	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116821	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116822	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116823	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116824	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116825	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116826	LH2	DRILL STEMS C/W TOOL JOINTS # 92011595	0.13	500
116829	TD1	WOOD CRATE (SITE MATERIALS)	2.00	545
116830	TD1	WOOD CRATE (SITE MATERIALS)	1.52	660
116831	LH2	ACCESSORIES FOR THE CRUSHER	0.92	368
116832	LH2	ACCESSORIES FOR THE CRUSHER	7.00	2637

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
116833	LH2	HP400 MAIN FRAME	12.18	7119
116858	LH2	HP400 CRUSHER (HP400329)	18.47	24948
116859	LH2	JAW, STONE CRUSHER	0.76	2807
116860	LH2	JAW, STONE CRUSHER	0.76	2807
116861	LH2	JAW, STONE CRUSHER	0.76	2807
116875	LH2	1 ROLL BLACK EL 6140 270" 40MIL SE TEX-1	0.60	150
116876	TD3	SCREENING PLANT + PALLET ON TOP	51.23	2949
116877	LH2	PALLET STC: 4 TIRES	1.31	197
116878	LH2	PALLET STC: 2 METAL PLATES	0.70	98
116879	TD3	PALLET STC: BUCKET	17.95	2781
116880	TD3	PALLET INSIDE BUCKET (#116879)	0.38	
116899	LH2	OPEN CRATE + CARBOARD BOXES ON TOP	2.56	588
116901	TD2	BUNDLE OF PLYWOOD	2.98	1367
118074	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118075	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118076	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118077	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118078	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118079	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118080	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118081	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118082	LH2	JAW, COAL STONE CRUSHER	0.81	2898
118380	D2	CRATE STC: AEROSOLS	5.36	1538
118382	D2	CRATE STC: AEROSOLS	3.28	923

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
118466	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.37	845
118467	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.37	845
118468	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.37	845
118469	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.37	845
118470	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.37	845
118471	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.37	845
118472	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.37	845
118473	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.37	845
118474	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.32	631
118476	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.32	631
118477	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.28	423
118478	LH3	STEEL ROD: T51 x 12 FT RD51MM	0.28	631
118579	LH2	JAWS, STONE CRUSHER	0.81	2789
118580	LH2	JAWS, STONE CRUSHER	0.81	2789
118581	LH2	JAWS, STONE CRUSHER	0.81	2789
118582	LH2	JAWS, STONE CRUSHER	0.81	2789
118583	LH2	JAWS, STONE CRUSHER	0.81	2789
118584	LH2	JAWS, STONE CRUSHER	0.81	2789
118585	LH2	JAWS, STONE CRUSHER	0.81	2789
118586	LH2	JAWS, STONE CRUSHER	0.81	2789
118587	LH2	JAWS, STONE CRUSHER	0.81	2789
300349	D1	20' CONTAINER 349669-8 STC: CARLO CHAIRS BLACK & ORANGE	38.55	3350
300388	D1	20' CONTAINER 351750-6 SEAL NO: 2971460 STC: ELECTRIC WIRING ON REELS & POSTS/SIGNS	38.55	7998

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PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
300389	D2	20' CONTAINER 889907-6 SEAL NO: 2971461 STC: EMPTY BOTTLE COOLERS	38.55	5905
300407	D3	20' CONTAINER 302160-5 SEAL NO: 2971477 STC: WINTER BOOTS	38.55	4698
300420	D3	20' CONTAINER 302202-6 STC: DURON XL OW-30 ENGINE OIL	38.55	5826
300457	D3	20' CONTAINER #368763-9 SEAL #2971526 STC: FILTERS	38.55	3765
300470	LH3	20' CONTAINER 258491-5 STC: MIXED CARGO	38.55	12327
300471	D4	20' CONTAINER 216203-0 STC: TIRES MICHELIN TLX X2 325/95 R24	38.55	9327
300479	TD1	20' CONTAINER 359001-9 STC: HYDREX EXTREME 1040L IBC	38.55	12000
300481	D3	20' CONTAINER 220386-6 STC: MIXED CARGO	38.55	6049
300482	TD1	20' CONTAINER 290425-9 STC: BOWL HP 400(1) - MANTLE HP 400 (1)	38.55	13004
300490	LH3	20' CONTAINER 351452-8 STC: BOWL HP 400(1) - MANTLE HP 400(1)	38.55	12889
300491	LH3	20' CONTAINER 233539-9 STC: BOWL HP400(1) - MANTLE HP 400(1)	38.55	12954
300496	TD1	20' CONTAINER 113420-7 STC: HYDREX EXTREME 1040L IBC	38.55	12030
300498	TD1	20' CONTAINER 796537-3 STC: HYDREX EXTREME 1040L IBC	38.55	11980
301010	D3	20' CONTAINER 123895-8 STC: FILTERS	38.55	3565
301011	D3	20' CONTAINER 118296-7 STC: FILTERS	38.55	3405
301014	D3	20' CONTAINER 284965-0 STC: POWER MODULES	38.55	5969
301015	LH1	20' CONTAINER 382892-9 STC: BWOLS HP 400 - MANTLE HP 400	38.55	12944
301016	D3	20' CONTAINER 350619-0 STC: ABSORBENT PADS	38.55	4262
301017	D3	20' CONTAINER 390891-7 STC: ABSORBENT PADS	38.55	4600

VALPORT
Les services maritimes inc.
Maritime Services Inc.

MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 13-Sep-16

NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
301019	LH3	20' CONTAINER 382977-7 STC: PERCUSSION DRILL BITS	38.55	16210
301020	LH1	20' CONTAINER 349694-9 STC: PECUSSION DRILL BITS	38.55	16210
301029	D2	20' CONTAINER 332997-0 STC: MIXED CARGO	38.55	3823
301035	D3	20' CONTAINER 122597-2 STC: STAKE SURVEYS	38.55	9275
301037	D3	20' CONTAINER 240379-8 STC: MIXED CARGO + AEROSOL CLEANER LUBRICANT	38.55	9173
301038	D3	20' CONTAINER 116252-0 STC: INDUSTRIAL UNIT HEATERS	38.55	3528
301039	D3	20' CONTAINER 316925-7 STC: MIXED CARGO	38.55	5165
301040	D3	20' CONTAINER 161084-0 STC: Q-3000 RIGID SIDES	38.55	4190
301042	TD1	20' CONTAINER 122212-3 STC: SCREEN MACHINE PARTS	38.55	11270
301044	TD1	20' CONTAINER 722842-2 STC: SCREEN MACHINE PARTS	38.55	11340
301046	D3	20' CONTAINER 254442-7 STC: MIXED CARGO	38.55	4932
301048	D3	20' CONTAINER 301751-8 STC: MIXED CARGO	38.55	6134
301053	D3	20' CONTAINER 216806-3 STC: MIXED CARGO	38.55	6678
301058	LH3	20' CONTAINER 238202-8 STC: DURON E-SYNTHETIC 5W-40 1040	38.55	12050
301059	LH3	20' CONTAINER 909917-0 STC: DURON E-SYNTHETIC 5W-40 1040	38.55	12030
301060	LH3	20' CONTAINER 351797-5 STC: MIXED CARGO	38.55	11705
301064	D3	20' CONTAINER 253320-3 STC: MIXED CARGO	38.55	9430
301065	D3	20' CONTAINER 335748-3 STC: MIXED CARGO	38.55	6951
301066	D3	20' CONTAINER 280773-4 STC: MIXED CARGO	38.55	7052
301069	D3	20' CONTAINER 238064-2 STC: MIXED CARGO	38.55	4662
301078	LH3	20' CONTAINER 155189-1 STC: MIXED CARGO	38.55	12140
301080	LH2	20' CONTAINER 123500-7 STC: RAIL CLAMP MILD STEEL FOR FS 353	38.55	14589

VALPORT
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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 13-Sep-16

NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
301081	LH3	20' CONTAINER 393986-0 STC: RAIL CLAMP MILD STEEL FOR FS 353	38.55	14497
301082	D3	20' CONTAINER 130920-2 STC: MIXED CARGO	38.55	8066
301083	D3	20' CONTAINER 292725-7 STC: MIXED CARGO	38.55	5831
301084	LH3	20' CONTAINER 181698-1 STC: SCREEN MACHINE PARTS	38.55	11561
301085	D3	20' CONTAINER 227440-3 STC: SCREEN MACHINE PARTS	38.55	9218
301086	LH3	20' CONTAINER 184959-8 STC: MIXED CARGO	38.55	11732
301087	LH1	20' CONTAINER 226540-1 STC: CONVEYOR PARTS	38.55	10476
301088	D3	20' CONTAINER 146757-0 STC: CONVEYOR PARTS	38.55	9282
301089	LH1	20' CONTAINER 013974-8 STC: SCREEN PARTS	38.55	10895
301090	D3	20' CONTAINER 289562-7 STC: MIXED CARGO	38.55	5627
301093	D3	20' CONTAINER 171969-7 STC: MIXED CARGO	38.55	4332
301097	LH1	20' CONTAINER 646039-4 STC: BOWLS & MANTLES	38.55	12889
301098	LH1	20' CONTAINER 153481-0 STC: JAW COAL STONE CRUSHER, BOWL/MANTLE	38.55	13030
301102	LH1	20' CONTAINER 051413-7 STC: JAW CRUSHERS & BOWL/MANTLE	38.55	12892
301103	LH1	20' CONTAINER 675240-0 STC: CONVEYOR ACCESSORIES	38.55	10980
301104	LH1	20' CONTAINER 234927-2 STC: TOTE ROTELLA T6 OW40	38.55	11650
301105	LH1	20' CONTAINER 274314-1 STC: CONVEYOR PARTS	38.55	11251
301108	LH1	20' CONTAINER 233495-0 STC: MIXED CARGO	38.55	10190
301111	D4	20' CONTAINER 158057-0 STC: MIXED CARGO	38.55	7286
301112	D4	20' CONTAINER 126278-5 STC: MIXED CARGO	38.55	8167
301115	D3	20' CONTAINER 235174-7 STC: MIXED CARGO	38.55	7731
301119	LH3	20' CONTAINER 213596-0 STC: JAW CRUSHER, BOWL/MANTLE	38.55	12990

VALPORT
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Maritime Services Inc.

MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 13-Sep-16
NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
301120	LH2	20' CONTAINER 227382-8 STC: BOWLS/MANTLES	38.55	12934
301121	LH2	20' CONTAINER 123621-4 STC: BOWLS/MANTLES	38.55	12934
301122	D4	20' CONTAINER 209120-3 STC: BOWLS/MANTLES	38.55	12914
301124	D4	20' CONTAINER 203989-7 STC: BOWL/MANTLES	38.55	12884
301125	LH2	20' CONTAINER 225387-6 STC: BOWLS/MANTLES	38.55	13054
301126	LH2	20' CONTAINER 223954-3 STC: BOWLS/MANTLES	38.55	13054
301127	LH2	20' CONTAINER 235150-0 STC: BOWLS/MANTLES	38.55	12954
301128	LH2	20' CONTAINER 149357-9 STC: BOWLS/MANTLES	38.55	13044
301129	LH2	20' CONTAINER 220456-1 STC: BOWLS/MANTLES	38.55	12954
301131	LH2	20' CONTAINER 112134-4 STC: BOWLS/MANTLES	38.55	12934
301132	LH2	20' CONTAINER 115915-0 STC: BOWLS/MANTLES	38.55	12934
301138	LH2	20 ' CONTAINER 319047-7 STC: MIXED CARGO	38.55	11489
301140	D4	20' CONTAINER 303807-9 STC: TRUCK PIECES	38.55	9000
301142	D4	20' CONTAINER 768630-8 STC: MIXED CARGO	38.55	10534
301145	D3	20' CONTAINER # 225498-1 SEAL # 4221070 STC: SCREENING AND CRUSHING MACHINE PARTS	38.55	6358
301147	D3	20' CONTAINER #744378-2 SEAL #4221068 STC: MIXED CARGO	38.55	6901
301149	D3	20' CONTAINER 295993-2 STC: TOROMONT CARGO FOR AIRPORT	38.55	11358
301152	D3	20' CONTAINER 399892-6 STC: MIXED CARGO	38.55	7513
301156	D1	20' CONTAINER 343184-2 STC: MIXED CARGO	38.55	7310
302257	D4	20' CONTAINER 20166116 STC: DRY FOOD	38.55	4678
302510	D4	20' CONTAINER GTCU2016733 STC: DRY FOOD	38.55	3995
302512	D4	20' CONTAINER GTCU2016369 STC: DRY FOOD	38.55	2930

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 13-Sep-16
NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302525	D3	20' REEFER CONTAINER SUDU1035119 STC: FROZEN FOOD	38.55	10884
302544	LH2	20' CONTAINER FSCU7714349 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	11531
302545	LH2	20' CONTAINER ZIMU2583138 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	9993
302546	D1	20' CONTAINER UESU222225-8 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	7156
302549	D1	20' CONTAINER ZIMU2575180 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	8666
302558	LH2	20' CONTAINER GLDU202323-8 STC: CONVEYOR COMPONENTS	38.55	13258
302559	LH2	20' CONTAINER IPXU369444-0 STC: CONVEYOR COMPONENTS	38.55	12505
302563	LH2	20' CONTAINER MANU3216018 STC: CASTS	38.55	12320
302564	LH2	20' CONTAINER LCRU 109284-8 STC: CASTS	38.55	12320
302566	D3	20' CONTAINER NSSU0033699 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	4577
302567	LH2	20' CONTAINER LCRU2076667 STC: CASTS	38.55	12320
302568	LH2	20' CONTAINER WSCU2454483 STC: CASTS	38.55	12320
302569	D1	20' CONTAINER KMTU730975-1 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	9852
302570	D1	20' CONTAINER NSSU003031-8 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	6264
302571	LH2	20' CONTAINER WSCU246837-9 STC: CASTS	38.55	12320
302572	LH2	20' CONTAINER CRXU1211407 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	10546

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RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 13-Sep-16
NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302573	D1	20' CONTAINER NSSU0031443 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	8853
302574	LH2	20' CONTAINER HJCU8295678 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	12124
302575	LH2	20' CONTAINER NSSU0033050 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	9894
302576	LH2	20' CONTAINER CRXU1607790 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	11601
302577	D1	20' CONTAINER HJCU8304790 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	7357
302578	D1	20' CONTAINER NSSU003187-0 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	6908
302579	D1	20 CONTAINER CAXU 615298-2 STC: BLUE BINS	38.55	7774
302580	D4	20' CONTAINER GESU3057133 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	5772
302581	LH2	20' CONTAINER GESU2570917 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	12620
302582	D1	20' CONTAINER TMLU 3052660 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	7756
302583	LH2	20' CONTAINER PCIU 313382-0 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	14089
302584	D4	20' CONTAINER CAXU298794-1 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	4944

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 13-Sep-16

NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302585	D3	20' CONTAINER HJCU8321334 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	3521
302586	D1	20' CONTAINER GESU3061468 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	8780
302587	D2	20' REEFER CONTAINER SUDU1035398 STC: REFRIGERATED FOOD DO NO FREEZE (DNGEROUS GOODS)	38.55	8150
302588	D2	20' REEFER CONTAINER SUDU 103308-1 STC: REFRIGERATED FOOD DO NOT FREEZE (DANGEROUS GOODS)	38.55	13083
302591	D3	20' CONTAINER CBHU3687973 STC: SPARE HEAVY EQUIPMENT PRTS	38.55	3521
302592	LH2	20' CONTAINER CBHU375332-9 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	10325
302593	LH2	20' CONTAINER CBHU370541-8 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	9913
302594	D1	20' CONTAINER CBHU362213-9 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	5406
302595	LH2	20' CONTAINER TGHU093798-7 STC: MINING PARTS	38.55	9072
302596	LH2	20' CONTAINER CLHU 287146-1 STC: MINING PARTS	38.55	9072
302597	LH2	20' CONTAINER CLHU277047-1 STC: MINING EQUIPMENT	38.55	10887
302598	D4	20' CONTAINER TGHU114030-2 STC: MINING EQUIPMENT	38.55	5070
302599	LH2	20' CONTAINER CLHU274535-5 STC: MINING EQUIPMENT	38.55	10524
302600	LH2	20' CONTAINER CLHU325607-1 STC: MINING EQUIPMENT	38.55	9526
302601	LH2	20' CONTAINER GESU315478-7 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	9347

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MANIFESTE DE NAVIRE - VESSEL MANIFEST

RAPPORT DE CHARGEMENT DE NAVIRE / VESSEL LOADING REPORT DATE: 13-Sep-16
NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302602	D3	20' CONTAINER FCIU281457-8 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	3973
302603	D1	20' CONTAINER GTCU201625-0 STC: DRY FOOD	38.55	8748
302605	LH2	20' CONTAINER CBHU 371347-6 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	10203
302606	D1	20' CONTAINER CBHU370978-0 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	8564
302607	D1	20' CONTAINER CBHU 371578-2 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	8379
302608	D4	20' CONTAINER CBHU39453-0 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	4932
302609	D3	20' REEFER SUDU103542-2 STC: REFRIGERATED FOOD DO NOT FREEZE	38.55	8771
302611	D1	20' CONTAINER GESU316634-5 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	7063
302612	LH2	20' CONTAINER CBHU373570-5 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	10343
302613	LH2	20' CONTAINER MTPU361431-5 STC: JAW DIE	38.55	10800
302614	LH2	20' CONTAINER MTPU302956-3 STC: JAW DIE	38.55	10800
302615	D4	20' CONTAINER WCIU784000-5 STC: MINING EQUIPMENT	38.55	5670
302616	D1	20' CONTAINER TGHU282673-0 STC: MINING EQUIPMENT	38.55	7031
302617	LH2	20' CONTAINER CBHU391339-2 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	12683

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NAVIRE / VESSEL : Rosaire Voy: 2 DESTINATION: MINE

PKG#	EMPLACEMENT LOCATION	DESCRIPTION	VOLUME (M^3)	POIDS WEIGHT (KGS)
302627	D3	20' CONTAINER GESU272559-9 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	9553
302628	LH2	20' CONTAINER GESU239656-0 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	8601
302631	D4	20' CONTAINER GESU265581-9 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	4611
302632	D3	20' CONTAINER GESU225230-4 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	9210
302633	D3	20' CONTAINER GESU242862-5 STC: SPARE HEAVY EQUIPMENT PARTS	38.55	8349

OUTBOUND SHIPPING MANIFESTS

2016 BackHaul Request

Qikiqtani Industry Limited (Camp Catering)

Jimmy Puk/Rick Langley P: 416.364.8820 ext 450 Email: richard.langley@baffinland.com, jimmy.puk@baffinland.com
F: Contact: Jimmy/Richard

Ship To : Sysco Central Ontario Phone: 613.601.8666
Address: 65 Elmdale Road Fax: -
Peterborough, ON K9J 0G5 Email: bryson.patricia@ont.sysco.com

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
1033250	Refrigerated Sea Can - empty	1	BH 3153	6830 lbs	20'	20'	8.5'	Rosaire	1
319974	Refrigerated Sea Can - empty	1	BH 3121	6830 lbs	20'	20'	8.5'	Rosaire	1
1033564	Refrigerated Sea Can - empty	1	BH 3161	6830 lbs	20'	20'	8.5'	Rosaire	1
1033749	Refrigerated Sea Can - empty	1	BH 3155	6830 lbs	20'	20'	8.5'	Rosaire	1
1033374	Refrigerated Sea Can - empty	1	BH31654	6830 lbs	20'	20'	8.5'	Rosaire	1
1033780	Refrigerated Sea Can - empty	1	BH 3159	6830 lbs	20'	20'	8.5'	Rosaire	1
2136775	Refrigerated Sea Can - empty	1	BH 3154	6830 lbs	20'	20'	8.5'	Rosaire	1
1037662	Refrigerated Sea Can - empty	1	BH 3160	6830 lbs	20'	20'	8.5'	Rosaire	1
156034	Heated Sea Can - empty	1	BH3165	6830 lbs	20'	20'	8.5'	Rosaire	1
1038890	Heated Sea Can - empty	1	BH3254	6830 lbs	20'	20'	8.5'	Rosaire	1
2052613	Dry Sea Can - empty	1	BH3162	6830 lbs	20'	20'	8.5'	Rosaire	1
2052830	Dry Sea Can - empty	1	BH3163	6830 lbs	20'	20'	8.5'	Rosaire	1
2052824	Dry Sea Can - empty	1	BH 3156	6830 lbs	20'	20'	8.5'	Rosaire	1
7514777	Dry Sea Can - empty	1	BH 3157	6830 lbs	20'	20'	8.5'	Rosaire	1
21018	Dry Sea Can - empty	1	BH 3158	6830slbs	20'	20'	8.5'	Rosaire	1
3725796	Dry Sea Can - empty	1	BH3166	6830 lbs	20'	20'	8.5'	Rosaire	1
2301514	Dry Sea Can - empty	1	BH 3186	6830 lbs	20'	20'	8.5'	Rosaire	1
3697270	Dry Sea Can - empty	1	BH 3187	6830 lbs	20'	20'	8.5'	Rosaire	1

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
3803483	Refrigerated Sea Can	1	BH 3111	6830 lbs	20'	20'	8.5'	Rosaire	1
1044281	Refrigerated Sea Can	1	BH 3174	6830 lbs	20'	20'	8.5'	Rosaire	1
1034283	Refrigerated Sea Can	1	BH 3206	6830 lbs	20'	20'	8.5'	Rosaire	1
2706422	Dry Sea Can	1	BH 3205	6830 lbs	20'	20'	8.5'	Rosaire	1
270626	Refrigerated Sea Can - empty	1	BH 3217	6830 lbs	20'	20'	8.5'	Rosaire	1
6474057	Refrigerated Sea Can - empty	1	BH3224	6830 lbs	20'	20'	8.5'	Rosaire	1
1032188	Refrigerated Sea Can - empty	1	BH 3225	6830 lbs	20'	20'	8.5'	Rosaire	1
1037451	Refrigerated Sea Can - empty	1	BH 3218	6830 lbs	20'	20'	8.5'	Rosaire	1
1037620	Refrigerated Sea Can - empty	1	BH 3216	6830 lbs	20'	20'	8.5'	Rosaire	1
1038437	Refrigerated Sea Can - empty	1	BH 3214	6830 lbs	20'	20'	8.5'	Rosaire	1
1032125	Refrigerated Sea Can - empty	1	BH 3215	6830 lbs	20'	20'	8.5'	Rosaire	1
2318495	Dry Sea Can - Food Return	1	BH3259	9500LBS	20'	20'	8.5'	Rosaire	1
2052845	Refrigerated Sea Can - empty	1	BH 3219	6830 lbs	20'	20'	8.5'	Rosaire	1
2006314	Refrigerated Sea Can - empty	1	BH 3220	6830 lbs	20'	20'	8.5'	Rosaire	1
7513446	Refrigerated Sea Can - empty	1	BH3222	6830 lbs	20'	20'	8.5'	Rosaire	1
1033100	Refrigerated Sea Can - empty	1	BH 3223	6830 lbs	20'	20'	8.5'	Rosaire	1

2016 Backhaul Request

TOROMONT CAT

P: 705-647-0598 x.4140
F: n/a

Email: mcharlebois@toromont.com
Contact: Mike Charlebois

Ship To : C/O Valport Maritime Services

Address: Port of Valleyfield
950 Boul Gerard Cadieux
Valleyfield QC, J6T

Phone: -

Fax: -

Contents: Heavy equipment and supplies

For furtherance to Toromont CAT, 3131 HWY 7 West, Concord, ON, L4K 1B7

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
100819	0780690	1	BH 3110	10129	20'	8.5'	8'	Rosaire	1
100895	FSCU7588195	1	BH 3238	12391	20'	8.5'	8'	Rosaire	1
103097	CSQ 3095783	1	BH 3135	10446	20'	8.5'	8'	Rosaire	1
104059	4137880	1	BH 3199	7713	40'	8.5'	8'	Rosaire	1
104060	XXXU 0305144	1	BH 3210	12416	40'	8.5'	8'	Rosaire	1
104061	XXXU 5520723	1	BH 3201	11232	40'	8.5'	8'	Rosaire	1
104424	5331119	1	BH3202	8314	40'	8.5'	8'	Rosaire	1
104460	ACSU8899279	1	BH 3209	11916	40'	8.5'	8'	Rosaire	1
105893	FCIU3921130	1	BH 3226	7046	20'	8.5'	8'	Rosaire	1
105895	TPHU 6666176	1	BH 3177	10771	20'	8.5'	8'	Rosaire	1
300438	HLXU2323832	1	BH 3240	12800	20'	8.5'	8'	Rosaire	1
300613	XXXU 1336326	1	BH3200	12460	40'	8.5'	8'	Rosaire	1
300623	HLXU2192497	1	BH 3247	9108	20'	8.5'	8'	Rosaire	1
300626	WFHU1236704	1	BH 3237	3660	20'	8.5'	8'	Rosaire	1
300628	HJCU8134272	1	BH 3239	7591	20'	8.5'	8'	Rosaire	1
300685	TEXU 377987	1	BH 3203	11086	20'	8.5'	8'	Rosaire	1
300730	UESU 2237129	1	BH 3180	12388	20'	8.5'	8'	Rosaire	1

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
300740	PCIU 3525230	1	BH 3208	10193	20'	8.5'	8'	Rosaire	1
300746	FSCU7855135	1	BH 3234	3474	20'	8.5'	8'	Rosaire	1
300756	LTIU3023502	1	BH 3235	3455	20'	8.5'	8'	Rosaire	1
300763	EISU 3772693	1	BH 3140	6077	20'	8.5'	8'	Rosaire	1
300766	PCIU 3657128	1	BH 3211	13596	20'	8.5'	8'	Rosaire	1
300769	MOAU 0449432	1	BH 3132	11373	20'	8.5'	8'	Rosaire	1
300775	HLXU 230820	1	BH 3134	6077	20'	8.5'	8'	Rosaire	1
300776	PCIU37208318	1	BH 3175	12800	20'	8.5'	8'	Rosaire	1
300778	DVRU1425738	1	BH 3136	12493	20'	8.5'	8'	Rosaire	1
300779	1162446	1	BH3188	12799	20'	8.5'	8'	Rosaire	1
300780	ECMU1200171	1	BH 3137	12697	20'	8.5'	8'	Rosaire	1
300782	GESU2339045	1	BH 3123	12697	20'	8.5'	8'	Rosaire	1
300784	CCLU2383132	1	BH 3003	12799	20'	8.5'	8'	Rosaire	1
300785	CLHU2750644	1	BH 3124	12390	20'	8.5'	8'	Rosaire	1
300786	DVRU1493310	1	BH 3128	12799	20'	8.5'	8'	Rosaire	1
300787	IRNU 1194990	1	BH 3182	12493	20'	8.5'	8'	Rosaire	1
300790	CCLU2361513	1	BH3144	12493	20'	8.5'	8'	Rosaire	1
300792	MOAU493570	1	BH 3258	3660	20'	8.5'	8'	Rosaire	1
300794	CLHU2946365	1	BH 3196	12799	20'	8.5'	8'	Rosaire	1
300795	CLHU27220721	1	BH 3139	12390	20'	8.5'	8'	Rosaire	1
300796	PCIU3827610	1	BH 3146	12799	20'	8.5'	8'	Rosaire	1
300797	CPSU1082731	1	BH3133	12596	20'	8.5'	8'	Rosaire	1
300802	CLHU2941717	1	BH3150	5315	20'	8.5'	8'	Rosaire	1
300803	CLHU2965365	1	BH 3253	7046	20'	8.5'	8'	Rosaire	1
300806	FCIU2414057	1	BH 3233	9773	20'	8.5'	8'	Rosaire	1
300808	TGHU2501884	1	BH 3112	7673	20'	8.5'	8'	Rosaire	1
300813	CLHU2667545	1	BH 3195	12493	20'	8.5'	8'	Rosaire	1
300816	CLHU2669403	1	BH3130	12390	20'	8.5'	8'	Rosaire	1
300817	CLHU2985660	1	BH 3244	5455	20'	8.5'	8'	Rosaire	1
300822	CLHU 3024585	1	BH-3170	11373	20'	8.5'	8'	Rosaire	1

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
300823	CLHU3062800	1	BH 3246	12799	20'	8.5'	8'	Rosaire	1
300827	CLHU2735969	1	BH 3173	12799	20'	8.5'	8'	Rosaire	1
300828	2805222	1	BH 3189	11891	20'	8.5'	8'	Rosaire	1
300833	EMCU 3886538	1	BH 3193	7826	20'	8.5'	8'	Rosaire	1
300836	IPXU3084670	1	BH 3246	12300	20'	8.5'	8'	Rosaire	1
300837	CLHU 302206	1	BH 3191	12697	20'	8.5'	8'	Rosaire	1
300845	GATU 1166633	1	BH-3171	12799	20'	8.5'	8'	Rosaire	1
300852	GESU 2646550	1	BH 3183	12390	20'	8.5'	8'	Rosaire	1
300853	GESU3358121	1	BH 3109	12390	20'	8.5'	8'	Rosaire	1
300854	GATU1070444	1	BH 3138	12799	20'	8.5'	8'	Rosaire	1
300855	GESU2299929	1	BH 3145	12390	20'	8.5'	8'	Rosaire	1
300869	YMLU 3073149	1	BH 3194	5666	20'	8.5'	8'	Rosaire	1
300872	YMLU2853789	1	BH 3241	455	20'	8.5'	8'	Rosaire	1
300878	SCZU7949958	1	BH 3127	7673	20'	8.5'	8'	Rosaire	1
300879	GESU3166047	1	BH 3147	10134	20'	8.5'	8'	Rosaire	1
300880	CLHU3714050	1	BH 3245	6719	20'	8.5'	8'	Rosaire	1
300881	GESU2168174	1	BH 3125	12697	20'	8.5'	8'	Rosaire	1
300884	SCZU7396301	1	BH 3142	12595	20'	8.5'	8'	Rosaire	1
300887	GESU3173426	1	BH 3129	10134	20'	8.5'	8'	Rosaire	1
300889	TCKU2300651	1	BH 3248	5669	20'	8.5'	8'	Rosaire	1
300892	TTNU 1399229	1	BH 3192	12390	20'	8.5'	8'	Rosaire	1
300896	TTNU3557261	1	BH 3236	12390	20'	8.5'	8'	Rosaire	1
300908	GESU3081850	1	BH 3141	12390	20'	8.5'	8'	Rosaire	1
300909	TTNU3727291	1	BH 3126	1673	20'	8.5'	8'	Rosaire	1
300929	MOAU 0492953	1	BH 3178	12799	20'	8.5'	8'	Rosaire	1
300933	MOAU 0425493	1	BH 3167	4053	20'	8.5'	8'	Rosaire	1
300934	CLHU2874455	1	BH 3252	9108	20'	8.5'	8'	Rosaire	1
300935	CLHU 2597622	1	BH 3149	12799	20'	8.5'	8'	Rosaire	1
300936	GESU3260285	1	BH 3232	12800	20'	8.5'	8'	Rosaire	1
300938	GESU 3098908	1	BH 3184	12696	20'	8.5'	8'	Rosaire	1

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
300939	GESU 3089526	1	BH-3169	12390	20'	8.5'	8'	Rosaire	1
300940	GESU 3254699	1	BH 3190	12799	20'	8.5'	8'	Rosaire	1
300941	GESU 3197900	1	BH 3168	12390	20'	8.5'	8'	Rosaire	1
300942	GESU 3195507	1	BH 3185	12799	20'	8.5'	8'	Rosaire	1
300943	GESU 3197095	1	BH 3148	12390	20'	8.5'	8'	Rosaire	1
300945	GESU 3374966	1	BH 3143	12799	20'	8.5'	8'	Rosaire	1
300955	MOAU 6506566	1	BH 3131	10321	20'	8.5'	8'	Rosaire	1
300960	MOAU0597717	1	BH3250	12800	20'	8.5'	8'	Rosaire	1
300961	MOAU 0423757	1	BH 3176	6955	20'	8.5'	8'	Rosaire	1
300966	MOAU 0491849	1	BH 3179	10090	20'	8.5'	8'	Rosaire	1
300967	MOAU6400790	1	BH 3249	11211	20'	8.5'	8'	Rosaire	1
300969	MOAU 0430632	1	BH3212	13079	20'	8.5'	8'	Rosaire	1
300973	MOAU 0482615	1	BH-3172	16810	20'	8.5'	8'	Rosaire	1
300980	XXXU 7272507	1	BH 3198	9237	20'	8.5'	8'	Rosaire	1
300981	XXXU 7286326	1	BH 3204	11528	20'	8.5'	8'	Rosaire	1
300994	CAXU2966466	1	BH 3251	12390	20'	8.5'	8'	Rosaire	1
302253	CPSU1065032	1	BH 3260	8864	20'	8.5'	8'	Rosaire	1
302523	TTNU3887197	1	BH 3242	12390	20'	8.5'	8'	Rosaire	1
302539	UESU2222427	1	BH 3257	3474	20'	8.5'	8'	Rosaire	1

2016 Backhaul Request

ADCO POWER LTD

P:
F:
Email:
Contact:

Ship To : ADCO POWER LTD
Phone: 780 465 3265
Address:
Fax: 780 466 8086

8750-58 AVE / T6E 6G6
EDMONTON

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
2326791	Return Tools (No TDG Required)	1	7983 KG	4309KGS	40'	8.5'	8'	Rosaire	1

2016 Backhaul Request

Baffinland Iron Mines - Departments

Ship To : PR Engineering LTD
Phone: 905-579-9721
Address: 249 Toronto Avenue
Fax:
Oshawa, Ont
L1H-3C2

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
-	HP400 Cone For Refurbishment (Crusher Cone)	1	BH 3256	6.30	96"	91"	66"	Rosaire	1
-	HP400 Cone For Refurbishment (Crusher Cone)	1	BH3255	6.30	96"	91"	66"	Rosaire	1
299207-0	Waste - Dangerous goods as per attached annex	1	BH3266	5.35	20'	8'	8'	Rosaire	1
143264-5	Waste - Dangerous goods as per attached annex	1	BH3270	5.50	20'	8'	8'	Rosaire	1
368645-5	Waste - Dangerous goods as per attached annex	1	BH3282	11.20	20'	8'	8'	Rosaire	1
033635-5	Waste - Dangerous goods as per attached annex	1	BH3317	8.00	20'	8'	8'	Rosaire	1
200278-0	Waste - Dangerous goods as per attached annex	1	BH3324	12.50	20'	8'	8'	Rosaire	1
335312-6	Waste - Dangerous goods as per attached annex	1	BH3297	3.35	20'	8'	8'	Rosaire	1
047770-6	Waste - Dangerous goods as per attached annex	1	BH3295	7.58	20'	8'	8'	Rosaire	1
365364-8	Waste - Dangerous goods as per attached annex	1	BH3305	9.03	20'	8'	8'	Rosaire	1
304439-3	Waste - Dangerous goods as per attached annex	1	BH3301	8.26	20'	8'	8'	Rosaire	1
228700-0	Waste - Dangerous goods as per attached annex	1	BH3324	5.22	20'	8'	8'	Rosaire	1
041148-4	Waste - Dangerous goods as per attached annex	1	BH3319	3.05	20'	8'	8'	Rosaire	1
303583-7	Waste - Dangerous goods as per attached annex	1	BH3321	2.50	20'	8'	8'	Rosaire	1
819012-9	Waste - Dangerous goods as per attached annex	1	BH3318	8.83	20'	8'	8'	Rosaire	1
679901-5	Waste - Dangerous goods as per attached annex	1	BH3316	10.34	20'	8'	8'	Rosaire	1
2917097	Waste - Dangerous goods as per attached annex	1	BH3300	10.41	20'	8'	8'	Rosaire	1
104738-1	Waste - Dangerous goods as per attached annex	1	BH3302	9.63	20'	8'	8'	Rosaire	1

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
328253-4	Waste - Dangerous goods as per attached annex	1	BH3303	4.90	20'	8'	8'	Rosaire	1
315432-8	Waste - Dangerous goods as per attached annex	1	BH3304	8.00	20'	8'	8'	Rosaire	1
038831-7	Waste - Dangerous goods as per attached annex	1	BH3285	13.32	20'	8'	8'	Rosaire	1
042051-0	Waste - Dangerous goods as per attached annex	1	BH3296	12.99	20'	8'	8'	Rosaire	1
369597-7	Waste - Dangerous goods as per attached annex	1	BH3283	6.73	20'	8'	8'	Rosaire	1
194692-1	Waste - Dangerous goods as per attached annex	1	BH3284	6.66	20'	8'	8'	Rosaire	1
349874-6	Waste - Dangerous goods as per attached annex	1	BH3280	7.12	20'	8'	8'	Rosaire	1
267701-9	Waste - Dangerous goods as per attached annex	1	BH3279	6.84	20'	8'	8'	Rosaire	1
352730-9	Waste - Dangerous goods as per attached annex	1	BH3278	6.84	20'	8'	8'	Rosaire	1
738092-3	Waste - Dangerous goods as per attached annex	1	BH3291	11.50	20'	8'	8'	Rosaire	1
296294-3	Waste - Dangerous goods as per attached annex	1	BH3299	15.56	20'	8'	8'	Rosaire	1
212759-4	Waste - Dangerous goods as per attached annex	1	BH3281	15.20	20'	8'	8'	Rosaire	1
217434-4	Waste - Dangerous goods as per attached annex	1	BH3298	10.00	20'	8'	8'	Rosaire	1
002581-5	Waste - Dangerous goods as per attached annex	1	BH3286	12.96	20'	8'	8'	Rosaire	1
316215-9	Waste - Dangerous goods as per attached annex	1	BH3287	10.00	20'	8'	8'	Rosaire	1
739346-5	Waste - Dangerous goods as per attached annex	1	BH3268	18.50	20'	8'	8'	Rosaire	1
366697-8	Waste - Dangerous goods as per attached annex	1	BH3265	18.50	20'	8'	8'	Rosaire	1
285832-5	Waste - Dangerous goods as per attached annex	1	BH3274	18.50	20'	8'	8'	Rosaire	1
216476-8	Waste - Dangerous goods as per attached annex	1	BH3261	4.75	20'	8'	8'	Rosaire	1
717003-8	Waste - Dangerous goods as per attached annex	1	BH3276	7.97	20'	8'	8'	Rosaire	1
237827-0	Waste - Dangerous goods as per attached annex	1	BH3262	10.00	20'	8'	8'	Rosaire	1
042974-8	Waste - Dangerous goods as per attached annex	1	BH3272	6.93	20'	8'	8'	Rosaire	1
384265-6	Waste - Dangerous goods as per attached annex	1	BH3277	5.76	20'	8'	8'	Rosaire	1
338835-5	Waste - Dangerous goods as per attached annex	1	BH3293	3.05	20'	8'	8'	Rosaire	1
355920-0	Waste - Dangerous goods as per attached annex	1	BH3275	10.90	20'	8'	8'	Rosaire	1
238149-0	Waste - Dangerous goods as per attached annex	1	BH3271	3.33	20'	8'	8'	Rosaire	1
048245-1	Waste - Dangerous goods as per attached annex	1	BH3273	3.02	20'	8'	8'	Rosaire	1
317912-2	Waste - Dangerous goods as per attached annex	1	BH3269	6.70	20'	8'	8'	Rosaire	1
605180-0	Waste - Dangerous goods as per attached annex	1	BH3290	4.80	20'	8'	8'	Rosaire	1
041091-3	Waste - Dangerous goods as per attached annex	1	BH3294	6.35	20'	8'	8'	Rosaire	1

Item #	Description	Qty	Backhaul	Weight (MT)	Dimensions (LxWxH)			Vessel Name	Vessel #
382311-9	Waste - Dangerous goods as per attached annex	1	BH3289	1.80	20'	8'	8'	Rosaire	1
239489-9	Waste - Dangerous goods as per attached annex	1	BH3288	8.55	20'	8'	8'	Rosaire	1
221934-8	Waste - Dangerous goods as per attached annex	1	BH3330	6.20	20'	8'	8'	Rosaire	1
304234-4	Waste - Dangerous goods as per attached annex	1	BH3331	4.80	20'	8'	8'	Rosaire	1
341018-6	Waste - Dangerous goods as per attached annex	1	BH3332	7.70	20'	8'	8'	Rosaire	1
788193-5	Waste - Dangerous goods as per attached annex	1	BH3340	4.10	20'	8'	8'	Rosaire	1
631381-3	Waste - Dangerous goods as per attached annex	1	BH3339	6.70	20'	8'	8'	Rosaire	1
810778-6	Waste - Dangerous goods as per attached annex	1	BH3338	8.20	20'	8'	8'	Rosaire	1
057965-6	Waste - Dangerous goods as per attached annex	1	BH3329	7.00	20'	8'	8'	Rosaire	1
517462-8	Waste - Dangerous goods as per attached annex	1	BH3328	7.80	20'	8'	8'	Rosaire	1
3181160	Waste - Dangerous goods as per attached annex	1	BH3325	9.40	20'	8'	8'	Rosaire	1
664949-6	Waste - Dangerous goods as per attached annex	1	BH3326	6.10	20'	8'	8'	Rosaire	1
049321-9	Waste - Dangerous goods as per attached annex	1	BH3327	7.90	20'	8'	8'	Rosaire	1
MI T01	EMPTY SEWAGE TANK	1	-	0.30	10'	8'	3'	Rosaire	1
6400173	Waste - Dangerous goods as per attached annex	1	BH3343	2.00	20'	8'	8'	Rosaire	1
2997840	Motor repair (No TDG Required)	1	BH3346	0.64	20'	8.5'	8'	Rosaire	1

MOVEMENT DOCUMENT / MANIFEST
DOCUMENT DE MOUVEMENT / MANIFESTE

The Movement document/manifest conforms to all federal and provincial transport and environmental legislation.
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

HL61034-5

Movement Document / Manifest Reference No. / N° de référence du document de mouvement/manifeste

A Generator / consignor — Producteur / expéditeur

Registration No. / Provincial ID No.: NUG100023

Company name / Nom de l'entreprise: BAFFINLAND IRON MINES

Mailing address / Adresse postale: 2275 Upper Middle East - Suite 300, Oakville, ON

E-mail / Courrier électronique: — Tel. No. / N° de tél.: 416 364 8820

Shipping site address / Adresse du lieu de l'expédition: MILNE INLET — 647-253-0596

City / Ville: MILNE INLET — Province: NU — Postal code / Code postal: X0A0S0

Intended Receiver / consignee — Réceptionnaire / destinataire prévu: QIKIQTANIQ ENVIRONMENTAL — Registration No. / Provincial ID No.: 1162926159

Mailing address / Adresse postale: 4935 Chateauneuf St, Suite 200, Brossard, QC, J4Z 3V4

E-mail / Courrier électronique: bdion@qenv.ca — Tel. No. / N° de tél.: 514 940 3332

Receiving site address / Adresse du lieu de réception: PORT OF VALLEYFIELD, 950, GRAND-CADIEUX BLVD

City / Ville: SALABERRY-DE-VALLEYFIELD — Province: QC — Postal code: J6T

B Carrier — Transporteur

Registration No. / Provincial ID No.: NUG200002

Company name / Nom de l'entreprise: NUNAVUT SEALIFT & SUPPLY INC.

Mailing address / Adresse postale: 6565 Hebert Blvd, Suite 201, Ste-Catherine, QC

E-mail / Courrier électronique: J5C 1B5 — Tel. No. / N° de tél.: 450 635 0833

Vehicle / Véhicule — Trailer - Rail car No. 1: M/V ROSAIRE A DESGAGNES

Port of entry / Point d'entrée: international use only — Port of exit / Point de sortie: international use only

Carrier Certification: I certify that I have received waste or recyclable material from the generator / consignor for delivery to the receiver / consignee as set out in Part A and that the information contained in Part B is complete and correct.
Attestation du transporteur : J'atteste avoir reçu les déchets ou matières recyclables du producteur / expéditeur en vue de leur livraison au réceptionnaire / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie): — Tel. No.: 450 635 0833

Year / Année — Month / Mois — Day / Jour — Signature:

C Receiver / consignee — Réceptionnaire / destinataire

Reference Nos. of other movement document(s)/manifest(s) used / N° de référence des autres documents de mouvement/manifestes utilisés

Registration No. / Provincial ID No.

Receiver / consignee information same as in Part A / Les renseignements du réceptionnaire / destinataire est la même qu'à la Partie A
☐ Yes / Oui ☐ No, complete the box below / Non, remplir la case ci-dessous

Company name / Nom de l'entreprise

Mailing address / Adresse postale

City / Ville — Province — Postal code / Code postal

E-mail / Courrier électronique — Tel. No. / N° de tél. ( )

Receiving site address / Adresse du lieu de destination

Date received / Date de réception: Year / Année — Month / Mois — Day / Jour — Time / Heure ☐ A.M. ☐ P.M.

If waste or recyclable material to be transferred, specify intended company name / Si les déchets ou matières recyclables doivent être transférés, préciser le nom du destinataire — Registration No./Provincial ID No.

Prov. code / Code prov.	Shipping name / Appellation réglementaire	Class / Classe, Sub. class(es) / Classe(s) sub.	UN No. / N° NU	Packing / mix gr.	Quantity shipped / Quantité expédiée	Units / Unités	Packaging/Container No. / N°	Codes	Phys. state / État phys.
(i)	SEE ANNEX ATTACHED								
(ii)									
(iii)									
(iv)									

Notice No. / N° de notification	Notice Line No. / N° de ligne de la notification	Shipment / Envoi	Of / De	D or R code / Code É ou R	C code / Code C	Basel Annex VIII or OECD Code / Annexe VIII de Bâle ou Code OCDE	H code / Code H	Y code / Code Y	Export / Exportation	Import / Importation	Customs code(s) / Code(s) de douanes
(i)											
(ii)											
(iii)											
(iv)											

international use only

Quantity received / Quantité reçue	Units / Unités	Comments / Commentaires	Handling Code / Code de manutention	Shipment Accepted / Accepté	Refused / Refusé	Decont. Pack.	Veh.

If handling code "Other" (specify) / Si code de manutention « autre » (spécifier)

Receiver / consignee certification: I certify that the information contained in Part C is correct and complete. / Attestation du réceptionnaire / destinataire : J'atteste que tous les renseignements à la partie C sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie)

Signature — Tel. No. / N° de tél. ( )

Special handling / Manutention spéciale: IN CASE OF EMERGENCY (24Hrs) CALL CANUTEC 1-613-996-6666
☐ Attached / Ci-joint ☒ As follows / Ci-contre

Generator / consignor certification: I certify that the information contained in Part A is correct and complete.
Attestation du producteur / expéditeur : J'atteste que tous les renseignements à la partie A sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie): WAYNE BEAUDOIN — Signature: [signature] — Tel. No. / N° de tél.: 514 940 3332

Date shipped / Date d'expédition: Year / Année — Month / Mois — Day / Jour — Time / Heure ☐ A.M. ☐ P.M. — Scheduled arrival date / Date d'arrivée prévue: Year / Année — Month / Mois — Day / Jour

ANNEXE MANIFEST : HL61034-5

line	Prov. Code	UN	SHIPPING NAME	CLASS	P.G	QUANT. SHIPPED (Kg)	PACKAGING		Phys. State
							No.	TYPE	
a.	D03	UN 1202	WASTE, FUEL, CLASS 3. P.G. III, (water percentage 10 to 20%)	3	III	107100	595	01	L
b.	D03	UN 1202	WASTE, FUEL, CLASS 3. P.G. III, (water percentage 10 to 20%)	3	III	2750	11	01	L
c.	D03	UN 1202	RESIDUS LAST CONTAINED, FUEL, (empty drum)	3	III	160	8	01	L
d.	D03	UN 1203	WASTE, GASOLINE, (water percentage 10 to 20%)	3	III	6660	37	01	L
e.	D03	UN 1203	WASTE, GASOLINE, (water percentage 10 to 20%)	3	III	1000	4	01	L
f.	D03	UN 1863	WASTE, FUEL AVIATION, TURBINE ENGINE, *(water percentage 0 to 20%)*	3	III	7920	44	01	L
g.	D03	UN 1863	WASTE, FUEL AVIATION, TURBINE ENGINE, *(water percentage 0 to 20%)*	3	III	1000	1	03	L
h.	L02	UN 1950	WASTE, AEROSOL, FLAMMABLE,	2.1	n-a	750	6	01	G/L
i.	L02	UN 1950	WASTE, AEROSOL, FLAMMABLE,	2.1	n-a	2400	16	05	G/L
j.	B11	UN 1993	WASTE, FLAMMABLE LIQUID, N.O.S. (adhesives)	3	II	600	2	05	S
k.	D03	UN 1993	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (mix petroleum product), *[mix of fuel, Jet A, Gasoline + water (water percentage 0 to 20%)]*	3	III	5000	5	03	L
l.	C02	UN 1993	WASTE, FLAMMABLE LIQUID, N.O.S. (varsol)	3	III	180	1	01	L
m.	E15	UN 2794	WASTE, BATTERIES, WET, FILLED WITH ACID, (used lead batteries)	8	III	5600	14	05	S/L
n.	G02	UN 2796	BATTERY, FLUID, ACID, (sulfuric acid solution 10%)	8	III	200	1	05	L
o.	E16	UN 3028	WASTE, BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE, SOLID,(dry cell)	8	III	250	1	01	S
p.	K01	UN 3316	WASTE, CHEMICAL KIT, *(used chemical analysis kit)*	9	II	360	2	05	S/L
q.	B13	N/R	HC CONTAMINATED SOLID	n-a *	n-a	450	3	01	S
r.	B13	N/R	HC CONTAMINATED SOLID	n-a	n-a	13500	54	01	S
s.	B13	N/R	HC CONTAMINATED SOLID	n-a	n-a	53750	215	05	S
t.	A03	N/R	HC CONTAMINATED WATER	n-a	n-a	26200	131	01	L
u.	A03	N/R	HC CONTAMINATED WATER	n-a	n-a	9250	37	01	L
v.	A03	N/R	HC CONTAMINATED WATER	n-a	n-a	26000	26	03	L
w.	E14	N/R	HUMAN WASTE	n-a	n-a	250	1	01	S
x.	B13	N/R	HYDROCARBONS CONTAMINATED PALLETS*(piles of 10 pallets)*	n-a	n-a	1000	4	07	S
y.	M07	N/R	KITCHEN GREASE	n-a	n-a	1000	4	01	P
z.	M07	N/R	KITCHEN GREASE	n-a	n-a	8000	32	05	P

Prepared by : Yvon Beaudoin - Project Manager - Qikiqtaaluk EnvironmentAL -

09/01/2016

ANNEXE MANIFEST : HL61034-5

line	Prov. Code	UN	SHIPPING NAME	CLASS	P.G	QUANT. SHIPPED (Kg)	PACKAGING		Phys. State
							No.	TYPE	
aa.	B09	N/R	MIX WASTE LABPACK	n-a	n-a	80	1	01	S/P/L
bb.	B09	N/R	MIX WASTE LABPACK	n-a	n-a	1600	2	07	S/P/L
cc.	L03	N/R	PLASTICS AND OTHERS DEBRIS	n-a	n-a	900	3	05	S
dd.	A03	N/R	RESIDUS LAST CONTAINED HC CONTAMINATED WATER*(empty totetank with residus)*	n-a	n-a	7000	70	03	S
ee.	A03	N/R	RESIDUS LAST CONTAINED HC CONTAMINATED WATER,*(empty drum with residus)*	n-a	n-a	6200	110	01	S
ff.	A03	N/R	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, *(empty salvage drum with residus)*	n-a	n-a	2200	1	01	S
gg.	E14	N/R	SEWER WATER,*(generated by S.T.P.)*	n-a	n-a	32	2	03	P
hh.	O02	N/R	SHREDDED PAPER FOR RECYCLING	n-a	n-a	2000	1	05	S
ii.	O02	N/R	USED ELECTRONIC PARTS	n-a	n-a	250	2	05	S
jj.	A01	N/R	USED HYDROCARBONS HOSES	n-a	n-a	500	1	07	S
kk.	D01	N/R	WASTE, ANTI-FREEZE AND WATER,*(used coolant + water)*	n-a	n-a	300	4	01	L
ll.	D01	N/R	WASTE, ANTI-FREEZE AND WATER,*(used coolant + water)*	n-a	n-a	800	2	01	L
mm.	D01	N/R	WASTE, ANTI-FREEZE AND WATER,*(used coolant + water)*	n-a	n-a	26000	26	03	L
nn.	D01	N/R	WASTE, ANTI-FREEZE AND OIL,	n-a	n-a	25000	2	03	L
oo.	D02	N/R	WASTE, AIRCRAFT DEICING FLUID	n-a	n-a	2000	1	01	L
pp.	E03	N/R	WASTE, ASHES (contaminated with metals)	n-a	n-a	180	14	01	S
qq.	E03	N/R	WASTE, ASHES (contaminated with metals)	n-a	n-a	2800	8	01	S
rr.	E03	N/R	WASTE, ASHES (contaminated with metals)	n-a	n-a	2000	1	05	S
ss.	E21	N/R	WASTE, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.S.A.(mercury) *(cru*	n-a	n-a	800	1	01	S
TT.	E21	N/R	WASTE, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.S.A.(mercury) *(cru*	n-a	n-a	200	1	01	S
uu.	A04	N/R	WASTE, GREASE	n-a	n-a	900	6	01	P
vv.	A04	N/R	WASTE, GREASE*(12 x 65 L metal drum)*	n-a	n-a	300	2	07	P

Prepared by : Yvon Beaudoin - Project Manager - Qikiqtaaluk EnvironmentAL -

09/01/2016

ANNEXE MANIFEST : HL61034-5

line	Prov. Code	UN	SHIPPING NAME	CLASS	P.G	QUANT. SHIPPED (Kg)	PACKAGING		Phys. State
							No.	TYPE	
ww.	A04	N/R	WASTE, GREASE	n-a	n-a	1750	7	05	P
xx.	B09	N/R	WASTE, LATEX PAINT*(LABPACK)*	n-a	n-a	100	1	01	L
yy.	B11	N/R	WASTE, MIX WASTE*(labpack)*	n-a	n-a	250	1	05	S/P/L
zz.	A05	N/R	WASTE, OIL FILTERS	n-a	n-a	1250	10	01	S
aaa.	A05	N/R	WASTE, OIL FILTERS	n-a	n-a	300	1	07	S
bbb.	A05	N/R	WASTE, OIL FILTERS	n-a	n-a	12000	80	01	S
ccc.	A05	N/R	WASTE, OIL FILTERS	n-a	n-a	600	1	05	S
ddd.	A05	N/R	WASTE, OIL FILTERS	n-a	n-a	600	1	03	S
eee.	A01	N/R	WASTE, OIL	n-a	n-a	18900	105	01	L
fff.	A01	N/R	WASTE, OIL	n-a	n-a	11250	45	01	L
ggg.	A01	N/R	WASTE, OIL	n-a	n-a	121000	121	03	L
hhh.	B13	N/R	WASTE, OILY DUST CONTROL SOLUTION	n-a	n-a	360	2	01	P
iii.	B13	N/R	WASTE, OILY DUST CONTROL SOLUTION	n-a	n-a	9000	9	03	P
jjj.	E03	N/R	WASTE, SLUDGE, *(ore sludge + water)*	n-a	n-a	1000	1	03	P
kkk.	O02	N/R	WASTE, TONER CARTRIDGES	n-a	n-a	250	1	05	S
lll.	E14	N/R	WATER TREATMENT SOLID RESIDU	n-a	n-a	10000	10	05	S
mmm.	O02	N/R	SCRAP METAL for recycling	n-a	n-a	8000	1	06	S
nnn.	L02	N/R	RESIDUE - LAST CONTAINED, ,AMMONIUM NITRATE, (empty AN bags)	n-a	n-a	1000	1	06	S
ooo.	L02	N/R	EMPTY SEWER TANK	n-a	n-a	1000	1	03	S

* n-a : not applicable

TYPE : 01 : drum , 03 : totetank 1000 L, 05 : quatrex bag, 06 : 40 foot marine container,
07 : line : x. bb. Wooden crate, jj. Tt. aaa. : pallet

Phys. Stat. (physical state) : G = gas, S = solid, P = sludge and L = liquid

Prepared by : Yvon Beaudoin - Project Manager - Qikiqtaaluk EnvironmentAL -

09/01/2016

IMDG DECLARATION

Shipper/consignor BAFFINLAND IRON MINES 2275, UPPER MIDDLE EAST RD, suite 310 OAKVILLE, ON MILNE INLET SITE MILNE INLET, NUNAVUT 647 253 0596	Reference number(s) MANIFEST HL61034-5, QE16-144 Page 1 of 1 Pages
Consignee QIKIQTAALUQ ENVIRONMENTAL 9935, CHATEAUNEUF ST, suite 200. BROSSARD, QC, J4Z 3V4 Tel: 514 940 3332 c/o BENOIT DION	Carrier NUNAVUT SEALIFT AND SUPPLY INC, 6565, HEBERT BLVD, suite 201 STE-CATHERINE, QC J5C 1B5 TEL: 450 635 0833
CONTAINER/VEHICLE PACKING CERTIFICATE **DECLARATION** It is declared that the packing of the goods into the container/vehicle has been carried out in accordance with the applicable provisions. **TO BE COMPLETED FOR SHIPMENTS IN CONTAINERS OR VEHICLES** Container/Vehicle #:	Name/status, company/organization of signatory YVON BEAUDOIN / PROJECT MANAGER / Q.E. Place and date MARY RIVER 09 01 2016 Signature on behalf of packer [signature]
Vessel No. and Date M/ ROSAIRE A. DESGAGNES Port of loading MILNE INLET Port of discharge VALLEYFIELD	(Reserved for text, instructions or other matter)

No. & Kind of Packages	DESCRIPTION OF GOODS (UN Number, PSN, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY Gross mass (kg)	Net mass (kg)	Cube (m³)
	SEE ANNEX ATTACHED			

Additional Information / Seal Number(s):

Emergency Telephone No. / 24-Hour Number: CALL CANUTEC 1-613-996-6666

SHIPPER'S DECLARATION I hereby declare that the contents of this consignment are fully and accurately described above by the Proper Shipping Name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national government regulations.	Name/status of declarant YVON BEAUDOIN / PROJECT MANAGER Place and date MARY RIVER SITE, 09 01 2016 Signature on behalf of shipper [signature]

ANNEX IMDG DECLARATION - REFERENCE MANIFEST : HL61034-5 Q.E. PROJECT QE16-149-2

No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
595	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	107100	148.8
11	Salvage drum 255 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	2750	3.3
8	Drum 205 L	UN 1202, RESIDUS LAST CONTAINED, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (empty drum)	160	2.0
37	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	6660	11.1
4	Salvage drum 255 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38oC closed cup (water percentage 10 to 20%)	1000	1.2
44	Drum 205 L	UN 1863, WASTE, FUEL AVIATION, TURBINE ENGINE, CLASS 3. P.G. III, Flash Point > 38°C closed cup	7920	11.0
1	Totetank 1000 L	UN 1863, WASTE, FUEL AVIATION, TURBINE ENGINE, CLASS 3. P.G. III, Flash Point > 38°C closed cup	1000	1.2
6	Salvage drum 255 L	UN 1950, WASTE, AEROSOL, FLAMMABLE, CLASS 2.1. P.G. N-A(not applicable)	750	1.5
16	Quatrex bag	UN 1950, WASTE, AEROSOL, FLAMMABLE, CLASS 2.1. P.G. N-A(not applicable)	2400	4.0
2	Quatrex bag	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (adhesives), CLASS 3, P.G. II, Flash Point > 4.4°C c.c.	600	2.4
5	Totetank 1000 L	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (mix petroleum product), CLASS 3. P.G. III, Flash Point > 38°C closed cup [*mix of fuel, Jet A, Gasoline + water (water percentage 0 to 20%)]*	5000	6.0
1	Drum 205 L	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (varsol), CLASS 3, P.G. II, Flash Point > 5°C c.c.	180	0.3
14	Quatrex bag	UN 2794, WASTE, BATTERIES, WET, FILLED WITH ACID, CLASS 8, P.G. N-A (used lead batteries)	5600	16.8
1	Quatrex bag	UN 2796, BATTERY, FLUID, ACID, CLASS 8, P.G. II (sulfuric acid solution 10%)	200	1.2
1	Salvage drum 255 L	UN 3028, WASTE, BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE, SOLID,, CLASS 8, P.G. III(dry cell)	250	0.3
2	Quatrex bag	UN 3316, WASTE, CHEMICAL KIT, CLASS 9. P.G. III, *(used chemical analysis kit)*	360	0.8
3	Drum 205 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	450	0.8
54	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	13500	16.2
215	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	53750	258.0
131	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	26200	32.75
37	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	9250	11.1
26	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	26000	31.2
1	Salvage drum 255 L	HUMAN WASTE, N/R not regulated as per TDGA	250	0.3

PREPARED BY : Yvon Beaudoin, Project Manager / Qikiqtaaluq Environmental

09/01/2016

ANNEX IMDG DECLARATION - REFERENCE MANIFEST : HL61034-5 Q.E. PROJECT QE16-149-2

No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
4	Pallets	HYDROCARBONS CONTAMINATED PALLETS N/R not regulated as per TDGA *(piles of 10 pallets)*	1000	4.8
4	Salvage drum 255 L	KITCHEN GREASE, N/R not regulated as per TDGA	1000	1.2
32	Quatrex bag	KITCHEN GREASE, N/R not regulated as per TDGA	8000	38.4
1	Drum 205 L	MIX WASTE LABPACK, N/R not regulated as per TDGA	80	0.25
2	WOODEN CRATE	MIX WASTE LABPACK, N/R not regulated as per TDGA	1600	2.4
3	Quatrex bag	PLASTICS AND OTHERS DEBRIS, N/R not regulated as per TDGA	900	3.6
70	Totetank 1000 L	RESIDUS LAST CONTAINED HC CONTMAINATED WATER, N/R not regulated as per TDGA *(empty totetank)*	7000	84.0
110	Drum 205 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty drum)*	2200	27.5
1	Salvage drum 255 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty salvage dr)*	32	0.3
2	Totetank 1000 L	SEWER WATER, N/R not regulated as per TDGA *(generated by S.T.P.)*	2000	2.4
1	Quatrex bag	SHREDDED PAPER FOR RECYCLING, N/R not regulated as per TDGA	250	1.2
2	Quatrex bag	USED ELECTRONIC PARTS, N/R not regulated as per TDGA	500	2.4
1	PALLET	USED HYDROCARBONS HOSES, N/R not regulated as per TDGA	300	2.0
4	Drum 205 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	800	1.00
2	Salvage drum 255 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	550	0.6
26	Totetank 1000 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	26000	31.2
2	Totetank 1000 L	WASTE, ANTI-FREEZE AND OIL, N/R not regulated as per TDGA	2000	2.4
1	Drum 205 L	WASTE, AIRCRAFT DEICING FLUID N/R not regulated as per TDGA	180	0.25
14	Drum 205 L	WASTE, ASHES, N/R not regulated as per TDGA	2800	3.50
8	Salvage drum 255 L	WASTE, ASHES, N/R not regulated as per TDGA	2000	2.4
1	Quatrex bag	WASTE, ASHES, N/R not regulated as per TDGA	800	1.2
1	Drum 205 L	WASTE, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.S.A.(mercury) *(crushed lightning tubes)*	200	0.25
1	Salvage drum 255 L	WASTE, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.S.A.(mercury) *(crushed lightning tubes)*	250	0.30

PREPARED BY : Yvon Beaudoin, Project Manager / Qikiqtaaluq Environmental

09/01/2016

ANNEX IMDG DECLARATION - REFERENCE MANIFEST : HL61034-5 Q.E. PROJECT QE16-149-2

No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
6	Drum 205 L	WASTE, GREASE, N/R not regulated as per TDGA	900	1.50
2	Pallet	WASTE, GREASE, N/R not regulated as per TDGA *(12 x 65 L metal drum)*	300	2.4
7	Quatrex bag	WASTE, GREASE, N/R not regulated as per TDGA	1750	8.4
1	Salvage drum 255 L	WASTE, LATEX PAINT, N/R not regulated as per TDGA *(LABPACK)*	100	0.3
1	Quatrex bag	WASTE, MIX WASTE, N/R not regulated as per TDGA *(labpack)*	250	1.2
10	Drum 205 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	1250	2.5
1	Pallet	WASTE, OIL FILTER, N/R not regulated as per TDGA *(9 x 65 L metal drum)*	300	1.2
80	Salvage drum 255 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	12000	24.0
1	quatrex bag	WASTE, OIL FILTERS, N/R not regulated as per TDGA	600	1.2
1	Totetank 1000 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	600	1.2
105	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	18900	26.3
45	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	11250	13.5
121	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	121000	145.2
2	Drum 205 L	WASTE, OILY DUST CONTROL SOLUTION N/R not regulated as per TDGA	360	0.50
9	Totetank 1000 L	WASTE, OILY DUST CONTROL SOLUTION, N/R not regulated as per TDGA	9000	10.8
1	Totetank 1000 L	WASTE, SLUDGE, N/R not regulated as per TDGA *(ore sludge + water)*	1000	1.2
1	Quatrex bag	WASTE, TONER CARTRIDGES, N/R not regulated as per TDGA	250	1.2
10	Quatrex bag	WATER TREATMENT SOLID RESIDU, N/R not regulated as per TDGA *(generated by S.T.P.)*	10000	12.0
	Not applicable	SCRAP METAL, N/R not regulated as per TDGA, (20 foot container used various metal equipment parts)	8000	32.0
	Not applicable	RESIDUE - LAST CONTAINED, UN 1942,AMMONIUM NITRATE, CLASS 5.1, P.G. III (40 foot container empty AN bags)	1000	64.9
1	SEWAGE TANK	EMPTY SEWER TANK, N/R not regulated as per TDGA	1000	5.0

PREPARED BY : Yvon Beaudoin, Project Manager / Qikiqtaaluq Environmental

09/01/2016

1	CONTAINER No. 299207-0 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
11	Salvage drum 255 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	1650	3.3
8	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1200	2.4
10	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***none***				

2	CONTAINER No. 143264-5 Location : Mary River				
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
20	Salvage drum 255 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	3000	6.0
10	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***none***				

3	CONTAINER No. 368645-5 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
3	Salvage drum 255 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	450	0.9
2	Drum 205 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	250	0.5
8	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	8000	9.6
10	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***none***				

4	**CONTAINER No. 033635-5 Location : Mary River**		
No. & Kind of packages	**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
		Gross mass(kg)	Cube (m^3)
Not applicable	SCRAP METAL, N/R not regulated as per TDGA, (used various metal equipment parts)	8000	32.0
placards required on 4 sides of the marine container: ***none***			

5	CONTAINER No. 220278-0 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
10	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	10000	12.0
10	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***none***				

6	CONTAINER No. 335312-6 Location : Mary River			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
6	Quatrex bag	UN 2794, BATTERIES, WET, FILLED WITH ACID, CLASS 8, P.G. N-A (used lead batteries)	2400	7.2
1	Quatrex bag	UN 2796, BATTERY, FLUID, ACID, CLASS 8, P.G. II (sulfuric acid solution 10%)	200	1.2
3	Quatrex bag	KITCHEN GREASE, N/R not regulated as per TDGA	750	3.6
placards required on 4 sides of the marine container: ***class 8***				

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7	CONTAINER No. 047770-6 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
3	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	540	0.8
17	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	3060	4.3
1	Drum 205 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	125	0.3
5	Salvage drum 255 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	750	1.5
4	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	600	1.2
10	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***CLASS 3***				

8	CONTAINER No. 365364-8 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
2	Salvage drum 255 L	UN 1950, WASTE, AEROSOL, FLAMMABLE, CLASS 2.1. P.G. N-A(not applicable)	250	0.5
4	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	800	1.0
3	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	825	0.9
1	Drum 205 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	150	0.25
4	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	600	1.2
3	Salvage drum 255 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	450	0.9
3	Drum 205 L	WASTE, GREASE, N/R not regulated as per TDGA	450	0.75
10	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
3	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	3000	3.6
placards required on 4 sides of the marine container: ***NONE*** *(less than 500 kg of dangerous goods)*				

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9	CONTAINER No. 304439-3 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
26	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	4680	6.5
2	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	500	0.6
2	Salvage drum 255 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	300	0.6
1	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	275	0.3
10	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***NONE***				

10	CONTAINER No. 228700-0 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
4	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	720	1.0
5	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1250	6.0
1	quatrex bag	WASTE, GREASE, N/R not regulated as per TDGA	250	1.2
3	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	3000	3.6
placards required on 4 sides of the marine container: ***NONE***				

11	CONTAINER No. 041148-4 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
3	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	450	0.9
7	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1750	8.4
1	quatrex bag	WASTE, OIL FILTERS, N/R not regulated as per TDGA	600	1.2
1	quatrex bag	USED ELECTRONIC PARTS, N/R not regulated as per TDGA	250	1.2
placards required on 4 sides of the marine container: ***NONE***				

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12	CONTAINER No. 303583-7 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
10	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***NONE***				

13	**CONTAINER No. 640017-3 Location : Mary River**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
8	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	1440	2.0
2	Salvage drum 255 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	500	0.6
9	Quatrex bag	UN 1950, WASTE, AEROSOL, FLAMMABLE, CLASS 2.1. P.G. N-A(not applicable)	2700	10.8
1	Quatrex bag	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (adhesives), CLASS 3, P.G. II, Flash Point > 4.4°C c.c.	300	1.2
5	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	1375	1.5
2	Salvage drum 255 L	WASTE ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant)*	550	0.6
4	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	4000	4.8
placards required on 4 sides of the marine container: ***CLASS 3 & CLASS 2.1***				

14	CONTAINER No. 819012-9 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
7	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	1260	1.8
2	Salvage drum 255 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	500	0.6
1	Drum 205 L	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (varsol), CLASS 3, P.G. II, Flash Point > 5°C c.c.	180	0.3
4	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup	720	1.2
5	Quatrex bag	UN 1950, WASTE, AEROSOL, FLAMMABLE, CLASS 2.1. P.G. N-A(not applicable)	1500	6.0
1	Quatrex bag	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (adhesives), CLASS 3, P.G. II, Flash Point > 4.4oC c.c.	300	1.2
5	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	900	1.3
1	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	250	0.3
1	Drum 205 L	WASTE, GREASE, N/R not regulated as per TDGA	150	0.3
1	Drum 205 L	WASTE ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant)*	200	0.25
4	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	720	1.0
1	Drum 205 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	150	0.3
3	Salvage drum 255 L	WASTE, ASHES, N/R not regulated as per TDGA	750	0.9
5	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1250	6.0
placards required on 4 sides of the marine container: ***CLASS 3 & CLASS 2.1***				

15	**CONTAINER No. 924857-2 (40 foot) Location : Mary River**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
1	Quatrex bag	UN 3316, WASTE, CHEMICAL KIT, CLASS 9. P.G. III, *(used chemical analysis kit)*	180	0.4
5	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	1375	1.5
4	Salvage drum 255 L	WASTE, ASHES, N/R not regulated as per TDGA	1000	1.2
6	quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1500	7.2
1	Totetank 1000 L	WASTE, OIL FILTERS, N/R not regulated as per TDGA	600	1.2
1	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	1000	1.2
1	Totetank 1000 L	WASTE ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant)*	1000	1.2
27	Totetank 1000 L	RESIDU LAST CONTAINED, N/R not regulated as per TDGA - EMPTY TOTETANK	2025	32.4
placards required on 4 sides of the marine container: ***NONE*** *(less than 500 kg of dangerous goods)*				

16	**CONTAINER No. 679901-5 Location : Mary River**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY** Gross mass(kg)	Cube (m^3)
11	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	1980	2.8
2	Salvage drum 255 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	500	0.6
11	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	1980	3.3
1	Quatrex bag	UN 3316, WASTE, CHEMICAL KIT, CLASS 9. P.G. III, *(used chemical analysis kit)*	180	0.4
5	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	900	1.25
1	Drum 205 L	MIX WASTE LABPACK, N/R not regulated as per TDGA	80	0.25
1	Drum 205 L	WASTE ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant)*	200	0.25
4	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	720	1.0
3	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	750	0.9
3	Drum 205 L	WASTE, ASHES, N/R not regulated as per TDGA	600	0.75
1	Pallet	WASTE, GREASE, N/R not regulated as per TDGA *(12 x 65 L metal drum)*	300	1.2
4	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1000	4.8
1	Quatrex bag	WASTE, KITCHEN GREASE, N/R not regulated as per TDGA	400	1.2
1	Quatrex bag	USED ELECTRONIC PARTS, N/R not regulated as per TDGA	250	1.2
1	Quatrex bag	WASTE, TONER CARTRIDGES, N/R not regulated as per TDGA	250	1.2
1	Quatrex bag	WASTE, MIX WASTE, N/R not regulated as per TDGA *(labpack)*	250	1.2
placards required on 4 sides of the marine container: ***CLASS 3 & CLASS 2.1***				

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17	CONTAINER No. 291709 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
7	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	1260	1.75
1	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	250	0.3
1	Drum 205 L	WASTE ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant)*	200	0.25
3	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	540	0.8
7	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	1750	2.1
11	Drum 205 L	WASTE, ASHES, N/R not regulated as per TDGA	2200	2.75
1	Drum 205 L	WASTE, GREASE, N/R not regulated as per TDGA *(12 x 65 L metal drum)*	180	0.25
1	Drum 205 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	150	0.3
1	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	250	0.3
1	Salvage drum 255 L	KITCHEN GREASE, N/R not regulated as per TDGA	250	0.3
2	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	500	0.6
1	Pallet	WASTE, OIL FILTER, N/R not regulated as per TDGA *(9 x 65 L metal drum)*	300	1.2
1	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	250	1.2
1	Quatrex bag	WASTE, KITCHEN GREASE, N/R not regulated as per TDGA	250	1.2
1	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	1000	1.2
1	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	1000	1.2
1	Totetank 1000 L	RESIDU LAST CONTAINED, N/R not regulated as per TDGA - EMPTY TOTETANK	75	1.2
placards required on 4 sides of the marine container: ***NONE***				

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18 CONTAINER No. 104738-1 Location : Mary River

No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
4	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	720	1.0
8	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	1440	2.4
1	Salvage drum 255 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38oC closed cup (water percentage 10 to 20%)	250	0.3
4	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	720	1.0
3	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	750	0.9
5	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1250	1.5
7	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	1750	2.1
1	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	250	1.2
6	Quatrex bag	WASTE, KITCHEN GREASE, N/R not regulated as per TDGA	1500	7.2
1	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	1000	1.2

placards required on 4 sides of the marine container: ***CLASS 3***

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19	CONTAINER No. 328253-4 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
1	Quatrex bag	UN 2794, BATTERIES, WET, FILLED WITH ACID, CLASS 8, P.G. N-A (used lead batteries)	400	1.2
4	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	1000	1.2
5	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	1250	1.5
7	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1750	2.1
2	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	500	0.6
placards required on 4 sides of the marine container: ***CLASS 8***				

20	CONTAINER No. 924967-1 (40 FOOT) Location : Mary River		
No. & Kind of packages	**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
		Gross mass(kg)	Cube (m^3)
not applicable	RESIDUE - LAST CONTAINED, UN 1942,AMMONIUM NITRATE, CLASS 5.1, P.G. III EMPTY AN BAGS	1000	64.9
placards required on 4 sides of the marine container: ***CLASS 5.1*** ***NOTE : PUT A TARP ON THE TOP OF THE CONTAINER***			

21	CONTAINER No. 890290-71 (40 FOOT) Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
20	Quatrex bag	WASTE, KITCHEN GREASE, N/R not regulated as per TDGA	5000	24.0
placards required on 4 sides of the marine container: ***NONE***				

22	CONTAINER No. 315432-8 Location : Mary River		
No. & Kind of packages	**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
		Gross mass(kg)	Cube (m^3)
Not applicable	SCRAP METAL, N/R not regulated as per TDGA, (used various metal equipment parts)	8000	32.0
placards required on 4 sides of the marine container: ***none***			

23	CONTAINER No. 038831-7 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
58	Drum 205 L	UN 1202, WASTE, FUEL. CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	10440	14.5
16	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	2880	4.0
placards required on 4 sides of the marine container: ***CLASS 3***				

24	**CONTAINER No. 0493219 Location : Mary River**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
64	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	11520	16.0
4	Drum 205 L	UN 1863, WASTE, FUEL AVIATION, TURBINE ENGINE, CLASS 3. P.G. II, Flash Point > 38°C closed cup *(water percentage 0 to 20%)*	720	1.0
6	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	1080	1.5
placards required on 4 sides of the marine container: ***CLASS 3***				

25	CONTAINER No. 042051-0 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
52	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	9360	13.0
4	Drum 205 L	UN 1863, WASTE, FUEL AVIATION, TURBINE ENGINE, CLASS 3. P.G. III, Flash Point > 38°C closed cup *(water percentage 0 to 20%)*	720	1.0
2	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	500	0.60
12	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	2160	3.0
1	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	250	0.3
placards required on 4 sides of the marine container: ***CLASS 3***				

26	CONTAINER No. 369597-7 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
32	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	5760	8.0
4	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	720	1.0
1	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	250	0.3
placards required on 4 sides of the marine container: ***CLASS 3***				

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27	CONTAINER No. 194692-1 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
37	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	6660	9.3
placards required on 4 sides of the marine container: ***CLASS 3***				

28	CONTAINER No. 349874-6 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
30	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	5400	7.5
4	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	720	1.0
1	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	1000	1.2
placards required on 4 sides of the marine container: ***CLASS 3***				

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29	**CONTAINER No. 267701-9 Location : Mary River**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
38	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	6840	9.5
placards required on 4 sides of the marine container: ***CLASS 3***				

30	CONTAINER No. 352730-9 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
38	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	6840	9.5
placards required on 4 sides of the marine container: ***CLASS 3***				

31	CONTAINER No. 769501-0 (40 FOOT) Location : Mary River			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
79	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	14220	19.8
placards required on 4 sides of the marine container: ***CLASS 3***				

32	**CONTAINER No. 787468-1 (40 FOOT) Location : Mary River**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
73	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	13140	18.3
4	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	720	1.2
placards required on 4 sides of the marine container: ***CLASS 3***				

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33	CONTAINER No. 738092-3 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
4	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	720	1.0
4	Drum 205 L	UN 1202, RESIDUS LAST CONTAINED, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (empty metal drum)	80	1.0
1	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	180	0.3
4	Drum 205 L	UN 1863, WASTE, FUEL AVIATION, TURBINE ENGINE, CLASS 3. P.G. II, Flash Point > 38°C closed cup *(water percentage 0 to 20%)*	720	1.0
1	Totetank 1000 L	UN 1863, WASTE, FUEL AVIATION, TURBINE ENGINE, CLASS 3. P.G. II, Flash Point > 38°C closed cup *(water percentage 0 to 20%)*	1000	1.2
2	Drum 205 L	WASTE, OILY DUST CONTROL SOLUTION N/R not regulated as per TDGA	360	0.50
1	Drum 205 L	WASTE, AIRCRAFT DEICING FLUID N/R not regulated as per TDGA	180	0.25
1	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	180	0.25
1	Drum 205 L	WASTE, GREASE, N/R not regulated as per TDGA	80	0.25
3	Pallets	HYDROCARBONS CONTAMINATED PALLETS N/R not regulated as per TDGA *(piles of 10 pallets)*	250	3.6
3	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	750	3.6
2	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	2000	2.4
3	Totetank 1000 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	3000	3.6
2	Totetank 1000 L	RESIDUS LAST CONTAINED HC CONTMAINATED WATER, N/R not regulated as per TDGA *(empty totetank with residus)*	2000	2.4
placards required on 4 sides of the marine container: ***CLASS 3***				

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34	CONTAINER No. 296294-3 Location : Mary River			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
25	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	4500	6.3
1	Totetank 1000 L	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (mix petroleum product), CLASS 3. P.G. III, Flash Point > 38°C closed cup *(mix fuel, Jet A, Gasoline + water percentage 0 to 20%)*	1000	1.2
15	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	2700	3.8
2	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	360	0.50
7	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	7000	8.4
placards required on 4 sides of the marine container: ***CLASS 3***				

35	CONTAINER No. 212759-4 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
18	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	3240	4.5
4	Totetank 1000 L	UN 1993, WASTE, FLAMMABLE LIQUID, N.O.S. (mix petroleum product), CLASS 3. P.G. III, Flash Point > 38°C closed cup *(mix fuel, Jet A, Gasoline + water percentage 0 to 20%)*	4000	4.8
18	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	3240	4.5
4	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	720	1.00
3	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	3000	3.6
1	Totetank 1000 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	1000	1.2
placards required on 4 sides of the marine container: ***CLASS 3***				

36	CONTAINER No. 047924-8 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
1	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA	1000	1.2
2	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	2000	2.4
5	Totetank 1000 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	5000	6.0
1	Totetank 1000 L	SEWER WATER, N/R not regulated as per TDGA *(generated by S.T.P.)*	1000	1.2
1	Pallets	HYDROCARBONS CONTAMINATED PALLETS N/R not regulated as per TDGA *(piles of 10 pallets)*	250	1.2
placards required on 4 sides of the marine container: ***NONE***				

37	**CONTAINER No. 217434-4 Location : Mary River**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
5	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	5000	6.0
4	Totetank 1000 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	4000	4.8
1	Totetank 1000 L	SEWER WATER, N/R not regulated as per TDGA *(generated by S.T.P.)*	1000	1.2
placards required on 4 sides of the marine container: ***NONE***				

38	CONTAINER No. 002581-5 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
8	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	1440	2.0
39	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	7020	9.8
1	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	250	0.3
1	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	250	1.2
1	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	1000	1.2
2	Totetank 1000 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	2000	2.4
1	Totetank 1000 L	WASTE, SLUDGE, N/R not regulated as per TDGA *(ore sludge + water)*	1000	1.2
placards required on 4 sides of the marine container: ***CLASS 3***				

39	CONTAINER No. 202149-8 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
3	Salvage drum 255 L	KITCHEN GREASE, N/R not regulated as per TDGA	750	0.9
9	Totetank 1000 L	WASTE, OILY DUST CONTROL SOLUTION, N/R not regulated as per TDGA	9000	10.8
placards required on 4 sides of the marine container: ***NONE***				

40	**CONTAINER No. 3154328 Location : Mary River**				
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**		
			Gross mass(kg)	Cube (m^3)	
1	Totetank 1000 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty totetank with residus)*	100	1.2	
Not applicable		SCRAP METAL, N/R not regulated as per TDGA, (used various metal equipment parts)	8000	32.0	
placards required on 4 sides of the marine container: ***none***					

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41	CONTAINER No. 316215-9 Location : Mary River			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
10	Quatrex bag	WATER TREATMENT SOLID RESIDU, N/R not regulated as per TDGA *(generated by S.T.P.)*	10000	12.0
placards required on 4 sides of the marine container: ***none***				

42	CONTAINER No. 739346-5 Location : Milne Inlet			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
1	Quatrex bag	HC CONTAMINATED SOLID, **N/R** not regulated as per TDGA	250	1.2
1	Quatrex bag	WASTE, GREASE, N/R not regulated as per TDGA	250	1.2
18	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA *(n.b. packed by B.I.M. and may contain anti-freeze and water)*	18000	21.6
placards required on 4 sides of the marine container: ***none***				

43	CONTAINER No. 366697-8 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
2	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	500	2.4
18	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA *(n.b. packed by B.I.M. and may contain anti-freeze and water)*	18000	21.6
placards required on 4 sides of the marine container: ***none***				

44	CONTAINER No. 700173-3 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
22	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	5500	26.4
placards required on 4 sides of the marine container: ***none***				

45	**CONTAINER No. 400003-3 Location : Milne Inlet**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
20	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	5000	24.0
placards required on 4 sides of the marine container: ***none***				

46	CONTAINER No. 285832-5 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
1	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	250	1.2
1	Quatrex bag	WASTE, GREASE, N/R not regulated as per TDGA	250	1.2
18	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA *(n.b. packed by B.I.M. and may contain anti-freeze and water)*	18000	21.6
placards required on 4 sides of the marine container: ***none***				

47	CONTAINER No. 216476-8 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
1	Salvage drum 255 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	250	0.3
1	Salvage drum 255 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38oC closed cup (water percentage 10 to 20%)	250	0.3
1	Salvage drum 255 L	UN 1950, WASTE, AEROSOL, FLAMMABLE, CLASS 2.1 P.G. II	100	0.3
5	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	900	1.25
5	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	1250	1.5
4	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1000	1.2
4	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	1000	1.2
*placards required on 4 sides of the marine container: **CLASS 3** (class 2.1 less than 500 kg, placards not-required)*				

48	CONTAINER No. 717003-8 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
2	Salvage drum 255 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	500	0.6
2	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	360	0.6
4	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	720	1.00
5	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	1250	1.5
3	Drum 205 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	540	0.75
4	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	1000	1.2
1	Salvage drum 255 L	WASTE, LATEX PAINT, N/R not regulated as per TDGA *(LABPACK)*	100	0.3
3	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	750	0.9
1	Salvage drum 255 L	HUMAN WASTE, N/R not regulated as per TDGA	250	0.3
10	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***CLASS 3***				

49	CONTAINER No. 237827-1 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
3	Salvage drum 255 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	750	0.9
7	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	1260	1.75
3	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	750	0.9
3	Drum 205 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	540	0.75
2	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	500	0.6
5	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1250	1.5
1	Drum 205 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA	200	0.25
1	Quatrex bag	WASTE, GREASE, N/R not regulated as per TDGA	250	1.2
10	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
2	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA *(n.b. packed by B.I.M. and may contain anti-freeze and water)*	2000	2.4
placards required on 4 sides of the marine container: ***CLASS 3***				

50	CONTAINER No. 042974-8 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
9	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	2250	2.7
1	Drum 205 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	180	0.25
8	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	2000	2.4
8	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2000	2.4
2	Salvage drum 255 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	500	0.6
placards required on 4 sides of the marine container: ***NONE***				

51	CONTAINER No. 384265-6 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
6	Drum 205 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	1080	1.5
1	Salvage drum 255 L	UN 1202, WASTE, FUEL, CLASS 3. P.G. III, Flash Point > 38°C closed cup (water percentage 10 to 20%)	250	0.3
3	Salvage drum 255 L	UN 1950, WASTE, AEROSOL, FLAMMABLE, CLASS 2.1. P.G. N-A(not applicable)	375	0.8
4	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	720	1.2
6	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	1080	1.50
3	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	750	0.9
1	Salvage drum 255 L	WASTE, ASHES, N/R not regulated as per TDGA	250	0.3
4	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	1000	1.2
1	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	250	0.3
placards required on 4 sides of the marine container: ***CLASS 3 & CLASS 2.1***				

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52	**CONTAINER No. 499182-5 (40 foot) Location : Milne Inlet**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY** Gross mass(kg)	Cube (m^3)
8	Drum 205 L	WASTE, OIL, N/R not regulated as per TDGA	1440	2.0
80	Drum 205 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty drum with residus)*	1600	20.0
1	Salvage drum 255 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty salvage drum with residus)*	32	0.3
3	Totetank 1000 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	3000	3.6
18	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA *(n.b. packed by B.I.M. and may contain anti-freeze and water)*	18000	21.6
placards required on 4 sides of the marine container: ***NONE***				

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53	CONTAINER No. 338835-5 Location : Milne Inlet			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
1	Pallet	WASTE, GREASE, N/R not regulated as per TDGA *(9 x 65 L metal drums + 2 x20 L oil)*	300	1.2
5	Drum 205 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty drum with residus)*	100	1.3
8	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2000	9.6
1	Quatrex bag	WASTE, KITCHEN GREASE, N/R not regulated as per TDGA	400	1.2
1	Quatrex bag	WASTE, GREASE, N/R not regulated as per TDGA	250	1.2
placards required on 4 sides of the marine container: ***NONE***				

54	**CONTAINER No. 355920-0 Location : Milne Inlet**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
5	Drum 205 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty drum with residus)*	100	1.3
8	Totetank 1000 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty totetank with residus)*	800	9.6
3	Totetank 1000 L	WASTE, ANTI-FREEZE AND WATER, N/R not regulated as per TDGA *(used coolant + water)*	3000	3.6
7	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA *(n.b. packed by B.I.M. and may contain anti-freeze and water)*	7000	8.4
placards required on 4 sides of the marine container: ***NONE***				

55	CONTAINER No. 238149-0 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
4	Drum 205 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty drum with residus)*	80	1.0
11	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2750	13.2
2	Quatrex bag	WASTE, GREASE, N/R not regulated as per TDGA	500	2.4
placards required on 4 sides of the marine container: ***NONE***				

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56	CONTAINER No. 048245-1 Location : Milne Inlet			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
1	Quatrex bag	UN 2794, BATTERIES, WET, FILLED WITH ACID, CLASS 8, P.G. N-A (used lead batteries)	400	1.2
6	Drum 205 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty drum with residus)*	120	1.5
10	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	2500	12.0
placards required on 4 sides of the marine container: ***CLASS 8***				

57	CONTAINER No. 317912-2 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number. Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
3	Drum 205 L	UN 1203, WASTE, GASOLINE, CLASS 3. P.G. II, Flash Point - 38°C closed cup (water percentage 10 to 20%)	540	0.9
32	Drum 205 L	UN 1863, WASTE, FUEL AVIATION, TURBINE ENGINE, CLASS 3. P.G. II, Flash Point > 38°C closed cup *(water percentage 0 to 20%)*	5760	8.0
1	Drum 205 L	WASTE, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.S.A.(mercury) *(crushed lightning tubes)*	200	0.25
1	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	200	0.25
placards required on 4 sides of the marine container: ***CLASS 3***				

58	**CONTAINER No. 605180-0 Location : Milne Inlet**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
6	Quatrex bag	UN 2794, WASTE, BATTERIES, WET, FILLED WITH ACID, CLASS 8, P.G. N-A (used lead batteries)	2400	7.2
2	Quatrex bag	UN 1950, WASTE, AEROSOL, FLAMMABLE, CLASS 2.1. P.G. N-A(not applicable)	300	0.5
1	Salvage drum 255 L	UN 3028, WASTE, BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE, SOLID,, CLASS 8, P.G. III (used dry cell)	250	0.3
1	Drum 205 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	200	0.25
5	Drum 205 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty drum with residus)*	100	1.3
2	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	500	0.6
1	Quatrex bag	WASTE, ASHES, N/R not regulated as per TDGA	800	1.2
1	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	250	1.2
placards required on 4 sides of the marine container: ***CLASS 8*** *(class 2.1 less than 500 kg, placards not-required)*				

59	CONTAINER No. 041091-3 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
2	WOODEN CRATE	MIX WASTE, N/R not regulated as per TDGA	1600	2.4
1	Quatrex bag	SHREDDED PAPER FOR RECYCLING, N/R not regulated as per TDGA	250	1.2
6	Quatrex bag	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	1500	7.2
2	Totetank 1000 L	WASTE, ANTI-FREEZE AND OIL, N/R not regulated as per TDGA	2000	2.4
1	Totetank 1000 L	WASTE, OIL, N/R not regulated as per TDGA *(n.b. packed by B.I.M. and may contain anti-freeze and water)*	1000	1.2
placards required on 4 sides of the marine container: ***NONE***				

60	CONTAINER No. 382311-9 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
1	PALLET	USED HYDROCARBONS HOSES, N/R not regulated as per TDGA	300	1.2
15	Totetank 1000 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty totetank with residus)*	1500	18.0
placards required on 4 sides of the marine container: ***NONE***				

61	**CONTAINER No. 382311-9 Location : Milne Inlet**			
No. & Kind of packages		**DESCRIPTION OF GOODS** (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	**QUANTITY**	
			Gross mass(kg)	Cube (m^3)
4	Totetank 1000 L	HC CONTAMINATED WATER, N/R not regulated as per TDGA	4000	4.8
1	Totetank 1000 L	WASTE, ANTI-FREEZE AND water, N/R not regulated as per TDGA	1000	1.2
8	Totetank 1000 L	RESIDUS LAST CONTAINED HC CONTAMINATED WATER, N/R not regulated as per TDGA *(empty totetank with residus)*	800	9.6
placards required on 4 sides of the marine container: ***NONE***				

62	CONTAINER No. 239489-9 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
1	Salvage drum 255 L	WASTE, OIL FILTER, N/R not regulated as per TDGA	250	0.3
10	Salvage drum 255 L	WASTE, OIL, N/R not regulated as per TDGA	2500	3.0
1	Salvage drum 255 L	WASTE, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.S.A.(mercury) *(crushed lightning tubes)*	250	0.30
1	Salvage drum 255 L	HC CONTAMINATED SOLID, N/R not regulated as per TDGA	250	0.3
3	Quatrex bag	PLASTICS AND OTHERS DEBRIS, N/R not regulated as per TDGA	3000	3.6
placards required on 4 sides of the marine container: ***NONE***				

MI-T01	SEWER TANK No. MI-T01 Location : Milne Inlet			
No. & Kind of packages		DESCRIPTION OF GOODS (UN Number, Shipping name, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	QUANTITY	
			Gross mass(kg)	Cube (m^3)
1	SEWAGE TANK	EMPTY SEWER TANK, N/R not regulated as per TDGA	250	1.0
placards required on 4 sides of the marine container: ***NONE***				

MOVEMENT DOCUMENT / MANIFEST
DOCUMENT DE MOUVEMENT / MANIFESTE

HL61035-2

This Movement document/manifest conforms to all federal and provincial transport and environmental legislation.
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

Movement Document / Manifest Reference No. / N° de référence du document de mouvement/manifeste

A Generator / consignor — Producteur / expéditeur

Registration No. / Provincial ID No. — N° d'immatriculation - d'id. provincial: NUG100023

Company name / Nom de l'entreprise: BAFFINLAND IRON MINES CORPORATION

Mailing address / Adresse postale, City / Ville, Province, Postal code / Code postal: 2275, Upper middle, Oakville, ON

E-mail / Courrier électronique: bdon@genv.ca — Tel. No. / N° de tél.: 514 940 3332

Shipping site address / Adresse du lieu de l'expédition: Steensby Camp site

City / Ville: Steensby — Province: Nunavut — Postal code / Code postal:

Intended Receiver / consignee — Réceptionnaire / destinataire prévu: QIKIQTAALUK Environmental

Registration No. / Provincial ID No. — N° d'immatriculation - d'id. provincial:

Mailing address / Adresse postale, City / Ville, Province, Postal code / Code postal: 9935 Chateauneuf St, Suite 200, Brossard QC

E-mail / Courrier électronique: 950, Boul. Gerard-Cadieux — Tel. No. / N° de tél.: 514 940 3332

Receiving site address / Adresse du lieu de l'expédition:

City / Ville: Valleyfield — Province: QC — Postal code / Code postal: J6T 6L4

B Carrier — Transporteur

Registration No. / Provincial ID No. — N° d'immatriculation - d'id. provincial:

Company name / Nom de l'entreprise: NUNAVUT SEALINK Supply Inc.

Mailing address / Adresse postale, City / Ville, Province, Postal code / Code postal: 201-6565 Hebert Bl, Ste-Catherine, QC, J5C 1B5

E-mail / Courrier électronique: — Tel. No. / N° de tél.: 450 635 0833

Vehicle / Véhicule	Registration No. / N° d'immatriculation	Prov.
Trailer - Rail car No. 1 / 1ʳᵉ remorque - wagon	N/V Rosaire Desgagnés	
Trailer - Rail car No. 2 / 2ᵉ remorque - wagon		

Port of entry / Point d'entrée: International use only — Port of exit / Point de sortie: International use only

Carrier Certification: I certify that I have received waste or recyclable material from the generator / consignor for delivery to the receiver / consignee as set out in Part A and that the information contained in Part B is complete and correct.
Attestation du transporteur: J'atteste avoir reçu les déchets ou matières recyclables du producteur / expéditeur en vue de leur livraison au réceptionnaire / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractères d'imprimerie): Jordan Ruest — Tel. No. / N° de tél.: 450 635 0833

Year / Année: 16 — Month / Mois: 08 — Day / Jour: 29 — Signature: Jordan Ruest

C Receiver / consignee — Réceptionnaire / destinataire

Reference Nos. of other movement document(s)/manifest(s) utilized / N° de référence des autres documents de mouvement/manifestes: BIM QE16-149-I

Registration No. / Provincial ID No. — N° d'immatriculation - d'id. provincial:

Receiver / consignee information same as in Part A / Les renseignements du réceptionnaire / destinataire est la même qu'à la Partie A
☐ Yes / Oui ☐ No, complete the box below / Non, remplir la case ci-dessous

Company name / Nom de l'entreprise:

Mailing address / Adresse postale:

City / Ville: — Province: — Postal code / Code postal:

E-mail / Courrier électronique: — Tel. No. / N° de tél.: ( )

Receiving site address / Adresse du lieu de destination:

Date received / Date de réception: Year / Année — Month / Mois — Day / Jour — Time / Heure ☐ A.M. ☐ P.M.

If waste or recyclable material to be transferred, specify intended company name / Si les déchets ou matières recyclables doivent être transférés, préciser le nom du destinataire — Registration No./Provincial ID No. / N° d'immatriculation/d'id provincial:

Waste details

	Prov. code / Code prov.	Shipping name / Appellation réglementaire	Class / Classe, Sub. class(es) / Classe(s) sub.	UN No. / N° NU	Packing / risk gr. / Gr. d'emballage / de risque	Estimated Quantity shipped / Quantité expédiée	Units L or / ou Kg / Unités	Packaging/Container No. / N°	Codes	Phys. state / État phys.
(i)	B04	UN1863 Waste Fuel Aviation Turbine Engine	3	1863	II	13820	Kg	79	01	L
(ii)	B04	UN1202 Waste, Diesel	3	1202	II	140	Kg	01	01	L
(iii)	L03	Sewer waste contaminated by hydrocarbon	N/R	—	—	24840	Kg	136	01	L
	L03	Human waste	N/A	—	—	5250	Kg	21	01	L/S
(iv)	L03	Wastes Ashes	N/R	—	—	4000	Kg	20	01	S
	L02	Empty Drum	N/R	—	—	2682	Kg	149	01	S

	Quantity received / Quantité reçue	Units L or / ou Kg / Unités	Comments / Commentaires	Handling Code / Code de manutention	Shipment / Envoi Accepted / Accepté	Refused / Refusé	Decont. Pack. / Cont.	Veh. / Véh.
(i)								
(ii)								
(iii)								
(iv)								

If handling code "Other" (specify) / Si code de manutention « autre » (spécifier):

International use only

	Notice No. / N° de notification	Notice Line No. / N° de ligne de la notification	Shipment / Envoi	Of / De	D or R code / Code E ou R	C code / Code C	Basel Annex VIII or OECD Code / Annexe VIII de Bâle ou Code OCDE	H code / Code H	Y code / Code Y	Export / Exportation	Import / Importation	Customs code(s) / Code(s) de douanes
(i)												
(ii)												
(iii)												
(iv)												

country of / Code du pays

Generator / consignor certification: I certify that the information contained in Part A is correct and complete.
Attestation du producteur / expéditeur: J'atteste que tous les renseignements à la partie A sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie): Yvon Beaudoin — Signature: [signature] — Tel. No. / N° de tél.: 514 444 5121

Date shipped / Date d'expédition: Year / Année: 16 — Month / Mois: 08 — Day / Jour: 29 — Time / Heure ☐ A.M. ☐ P.M.

Scheduled arrival date / Date d'arrivée prévue: Year / Année: 16 — Month / Mois: 09 — Day / Jour: 06

Receiver / consignee certification: I certify that the information contained in Part C is correct and complete.
Attestation du réceptionnaire / destinataire: J'atteste que tous les renseignements à la partie C sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie):

Signature: — Tel. No. / N° de tél.: ( )

Special handling / Manutention spéciale: IN CASE OF EMERGENCY (24 Hrs) ☐ Attached / Ci-joint ☒ As follows / Ci-contre: 1-613-996 6666

MOE 04-1917 (07/07)

Instructions for completion and distribution on reverse / Instructions pour compléter et distribuer au verso

Copy / Copie 1 (white / blanche

MOVEMENT DOCUMENT / MANIFEST
DOCUMENT DE MOUVEMENT / MANIFESTE

This Movement document/manifest conforms to all federal and provincial transport and environmental legislation.
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

HL61035-2

Movement Document / Manifest Reference No. / N° de référence du document de mouvement/manifeste

A Generator / consignor — Producteur / expéditeur

Registration No. / Provincial ID No. / N° d'immatriculation - d'id. provincial: NUG100023

Company name / Nom de l'entreprise: BAFFINLAND IRON MINES CORPORATION

Mailing address / Adresse postale, City / Ville, Province, Postal code / Code postal: 2275, UPPER MIDDLE, OAKVILLE, ON,

E-mail / Courrier électronique: bdion@genv.ca — Tel. No. / N° de tél.: 514 940 3332

Shipping site address / Adresse du lieu de l'expédition: STEENSBY CAMP SITE

City / Ville: STEENSBY — Province: NUNAVUT — Postal code / Code postal:

Intended Receiver / consignee — Réceptionnaire / destinataire prévu: QIKIQTAALUK ENVIRONMENTAL — Registration No. / Provincial ID No. / N° d'immatriculation - d'id. provincial:

Mailing address / Adresse postale, City / Ville, Province, Postal code / Code postal: 9435 CHATEAUNEUF ST, SUITE 200, BROSSARD QC

E-mail / Courrier électronique: — Tel. No. / N° de tél.: 514 940 3332

Receiving site address / Adresse du lieu de l'expédition: 950, BOUL. GERARD-CADIEUX

City / Ville: VALLEYFIELD — Province: QC — Postal code / Code postal: J6T 6L4

B Carrier — Transporteur

Registration No. / Provincial ID No. / N° d'immatriculation - d'id. provincial:

Company name / Nom de l'entreprise: NUNAVUT SEALINK SUPPLY INC.

Mailing address / Adresse postale, City / Ville, Province, Postal code / Code postal: 201-6565 HEBERT BL, STE-CATHERINE, QC, J5C 1B5

E-mail / Courrier électronique: — Tel. No. / N° de tél.: 450 635 0833

Vehicle / Véhicule	Registration No. / N° d'immatriculation	Prov.
Trailer - Rail car No. 1 / 1re remorque - wagon	N/V ROSAIRE DESGAGNÉS	
Trailer - Rail car No. 2 / 2e remorque - wagon		

Port of entry / Point d'entrée: International use only — Port of exit / Point de sortie: International use only

Carrier Certification: I certify that I have received waste or recyclable material from the generator / consignor for delivery to the receiver / consignee as set out in Part A and that the information contained in Part B is complete and correct. Attestation du transporteur : J'atteste avoir reçu les déchets ou matières recyclables du producteur / expéditeur en vue de leur livraison au réceptionnaire / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractères d'imprimerie): Jordan Ruest — Tel. No. / N° de tél.: 450 635 0833

Year / Année: 16 — Month / Mois: 08 — Day / Jour: 29 — Signature: [signature]

C Receiver / consignee — Réceptionnaire / destinataire

Reference Nos. of other movement document(s)/manifest(s) used / N° de référence des autres documents de mouvement/manifestes: BLM QE16-149-2

Registration No. / Provincial ID No. / N° d'immatriculation - d'id. provincial:

Receiver / consignee information same as in Part A / Les renseignements du réceptionnaire / destinataire est la même qu'à la Partie A
☐ Yes / Oui ☐ No, complete the box below / Non, remplir la case ci-dessous

Company name / Nom de l'entreprise:

Mailing address / Adresse postale:

City / Ville: — Province: — Postal code / Code postal:

E-mail / Courrier électronique: — Tel. No. / N° de tél.: ( )

Receiving site address / Adresse du lieu de destination:

Date received / Date de réception: Year / Année — Month / Mois — Day / Jour — Time / Heure ☐ A.M. ☐ P.M.

If waste or recyclable material to be transferred, specify intended company name / Si les déchets ou matières recyclables doivent être transférés, préciser le nom du destinataire — Registration No./Provincial ID No. / N° d'immatriculation/id provincial

Prov. code / Code prov.	Shipping name / Appellation réglementaire	Class / Classe, Sub. class(es) / Classe(s) sub.	UN No. / N° NU	Packing / risk gr. / Gr. d'emballage / de risque	Quantity shipped / Quantité expédiée	Units L or/ou Kg / Unités	Packaging/Container No. / N°	Codes Int - ext.	Phys. state / État phys.
(i) B04	UN1863 WASTE FUEL AVIATION TURBINE ENGINE	3	1863	II	13820	Kg	79	01	L
(ii) B04	UN1202 WASTE, DIESEL	3	1202	II	190	Kg	01	01	L
(iii) L03	SEWER WASTE CONTAMINATED BY HYDROCARBONS	N/R	—	—	24840	Kg	136	01	L
(iv) L02	HUMAN WASTE	N/A	—	—	5250	Kg	21	01	L/S
L03	WASTES ASHES	N/R	—	—	4000	Kg	20	01	S
L02	EMPTY DRUM	N/R	—	—	3683	Kg	149	01	S

Quantity received / Quantité reçue	Units L or/ou Kg / Unités	Comments / Commentaires	Handling Code / Code de manutention	Shipment / Envoi Accepted / Accepté	Refused / Refusé	Decont. Pack. Cont.	Veh.

If handling code "Other" (specify) / Si code de manutention « autre » (spécifier):

Notice No. / N° de notification	Notice Line No. / N° de ligne de la notification	Shipment / Envoi	Of / De	D or R code / Code É ou R	C code / Code C	Basel Annex VIII or OECD Code / Annexe VIII de Bâle ou Code OCDE	H code / Code H	Y code / Code Y	Export / Exportation	Import / Importation	Customs code(s) / Code(s) de douanes
(i)											
(ii)											
(iii)											
(iv)											

International use only

Country of / Code du pays:

Receiver / consignee certification: I certify that the information contained in Part C is correct and complete. / Attestation du réceptionnaire / destinataire : J'atteste que tous les renseignements à la partie C sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractères d'imprimerie):

Signature — Tel. No. / N° de tél.: ( )

Special handling / Manutention spéciale: IN CASE OF EMERGENCY, ☑ Attached / Ci-joint (24 Hour) ☒ As follows / Ci-contre: F 613-996 6666

Generator / consignor certification: I certify that the information contained in Part A is correct and complete. / Attestation du producteur / expéditeur : J'atteste que tous les renseignements à la partie A sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractères d'imprimerie): YVON BEAUDOIN — Signature: [signature] — Tel. No. / N° de tél.: 514 444 5127

Date shipped / Date d'expédition: Year / Année 16 — Month / Mois 08 — Day / Jour 29 — Time / Heure ☐ A.M. ☐ P.M.

Scheduled arrival date / Date d'arrivée prévue: Year / Année 16 — Month / Mois 09 — Day / Jour 06

IMDG DECLARATION

Shipper/consignor: # Steensby Camp, Baffinland Iron Mines, 2275 Upper Middle Oakville On. L6H 0C3	Reference number(s): QEG-149-2 Page 1 of 1 Pages
Consignee: Qikiqtaaluk Environment, 950 Boulevard Gerard Cadieux, Port Valleyfield	Carrier: NUNAVUT SEALIFT AND SUPPLY INC, 201, 6565 HEBERT BL, STE-CATHERINE QC, J5C 1B5
CONTAINER/VEHICLE PACKING CERTIFICATE **DECLARATION** It is declared that the packing of the goods into the container/vehicle has been carried out in accordance with the applicable provisions. **TO BE COMPLETED FOR SHIPMENTS IN CONTAINERS OR VEHICLES** Container/Vehicle #:	Name/status, company/organization of signatory: YVON BEAUDOIN, PROJECT MANAGER, Q.E. Place and date: STEENSBY INLET, NU 08-29-2016 Signature on behalf of packer: [signature]
Vessel No. and Date: M/V ROSAIRE A DESGAGNÉS Port of loading: STEENSBY INLET Port of discharge: VALLEYFIELD (QC)	(Reserved for text, instructions or other matter)

No. & Kind of Packages	DESCRIPTION OF GOODS (UN Number, PSN, Hazard Class, Packing Group, Flash Point, Marine Pollutant)	Gross mass (kg)	Net mass (kg)	Cube (m³)
79 DRUMS	UN 1863 WASTE, FUEL AVIATION, TURBINE ENGINE, CLASS 3, P.G. II FLASH POINT -35°C C.C.	16590	13800	24.0
1 DRUM	UN 1202, WASTE, DIESEL, CLASS 3, P.G. II FLASH POINT 38°C C.C.	210	190	0.25
136 DRUMS	SEWER WATER CONTAMINATED BY HYDROCARBONS N/R (NOT REGULATED UNDER IMDG)	28560	24840	29.2
21 SALVAGE DRUMS	HUMAN WASTE, N/R	5775	5250	9.3
20 ASHES DRUMS	WASTE ASHES, N/R	4400	4000	5
149 DRUMS	Empty metal DRUM, N/R	2682	2682	35

Additional information / Seal Number(s):

Emergency Telephone No. / 24-Hour Number: Call CANUTEC 1-613-996-6666

SHIPPER'S DECLARATION **I hereby declare that the contents of this consignment are fully and accurately described above by the Proper Shipping Name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national government regulations.**	Name/status of declarant: YVON BEAUDOIN / QE project manager Place and date: STEENSBY INLET, NU, 08/29/2016 Signature on behalf of shipper: [signature]

APPENDIX D.5

WASTE ROCK GEOCHEMISTRY REPORT, DATA AND STATUS UPDATE

Geochemical Characterization Program - Implementation Schedule Update - March 2017

		Refer to Report Section	Description	Status
1.0	**DRILLING PROGRAM**			
1.01	**Execute Drilling Program**	3.2.2, 3.3	2,000 - 3,000 m drill program utilizing rotary core rig focused on footwall and hanging wall of the deposit.	Program completed in Q3 2012.
1.02	**Core Logging**	3.3	Log and sample core in accordance to established methods.	Program completed in Q3 2012.
1.03	**Field Scale Geological Interpretation**	3.3	Utilizing new information obtained from drill logs, revise geological maps and cross-sections of the footwall and hanging wall of the deposit.	Rresults reported in 2013 and 2014 updates to the Waste Rock Management Plan.
2.0	**PREDICTIVE GEOCHEMICAL SAMPLING AND TESTING PROGRAMS**			
2.01	**Sampling**	4.1, 4.5	Systematic sampling of 2012 drill core of footwall and hanging wall based on established methods.	Program completed in Q3 2012.
2.02	**Static Testing**	4.2, 4.5	Static testing of select 2012 drill cores using established analytical methodologies.	Program completed in Q4 2012.
2.03	**Mineralogy**	4.3, 4.5	Detailed mineralogical characterization by R-XRD, optical microscopy, and SEM.	First phase of program completed in Q1 2013. Work still ongoing.
2.04	**PAG Segregation**	4.5	Ongoing synthesis of available data to assess importance and ability to segregate PAG materials.	Ongoing.
2.05	**Kinetic Testing - ongoing work**	4.4	Continuation of kinetic test initiated in May 2011.	Select humidity cells continue to run to present time.
2.06	**Kinetic Testing - from 2012 drill core**	4.4, 4.5	Continued expansion of laboratory kinetic test work program,	Further Expansion not required
			Upgrade and ongoing sampling of lysimeters, monitoring wells, and seepage.	Program currently not active. Work to recommence once there is adequate development of waste rock storage area.
			Assess feasibility of field waste rock test piles.	Ongoing.
			If feasible, construct and sample test piles.	To be determined.
3.0	**WATER QUALITY PREDICTIONS - WASTE ROCK AND PIT**			
3.01	**Hydrology**	5.4	Collect additional hydrological data.	Hydrology station established near waste rock storage area to collect site specific data for the purpose of future water quality modeling.
3.02	**Source Terms**	5.4	Better quantify source terms for pit and waste rock models.	Ongoing.
3.03	**Proportion of PAG**	5.4	Better quantify proportion of PAG in waste rock pile and pit walls.	Ongoins.
3.04	**ARD On-Set Time**	5.4	Improve understanding of ARD on-set times.	Ongoing.
3.05	**Surface Areas and Permafrost**	5.4	Improve understanding of surface area scaling values, active zone thickness, and water infiltration into waste rock pile. Conduct thermal modeling of waste rock pile.	Work to commence once there is adequate development of waste rock storage area.
3.06	**Mineralogy**	5.4	Incorporate processes of metal sorption and solid phase precipitation behaviour.	Ongoing.
4.0	**REPORTING UPDATES**			
4.01	**Interim Waste Rock Geochemical Characterization Report**	7.2	Annual report updates that present latest results of geochemical characterization program including waste rock geochemistry, waste rock and pit water quality modeling , and related studies. Reports to be provided March 31 of each year.	Technical updates provided in QIA/NWB Annual Reports.
4.02	**Waste Rock Water Quality Modeling Report**	7.2		Planned for 2017 once there is sufficient data available.
4.03	**Open Pit Water Quality Modeling Report**	7.2		Planned for 2017 once there is sufficient data available.

Baffinland

TABLE D.5.1
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016
SUMMARY STATISTICS

PAG	Fizz Rating	NP	MPA	MNP	(NP:MN	C (%)	S (%)
		t CaCO3/1000t	t CaCO3/1000t	t CaCO3/1000t			
COUNT	212	212	212	212	212	250	250
MIN	1.0	-12.00	6.60	-242.00	-0.410	0.005	0.210
MAX	1.0	24.00	243.10	17.00	3.200	0.830	11.500
MEAN	1.0	6.53	29.65	-23.17	0.470	0.054	0.966

NPAG	Fizz Rating	NP	MPA	MNP	Ratio	C (%)	S (%)
		t CaCO3/1000t	t CaCO3/1000t	t CaCO3/1000t			
COUNT	20	20	20	20	20	1313	1313
MIN	1.0	-3.00	6.30	-60.00	-0.1	0.005	0.005
MAX	1.0	18.00	56.90	6.00	1.9	20.100	0.200
MEAN	1.0	8.65	19.22	-10.65	0.797	0.210	0.036

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	630	N630001	2512						0.53	0.01	7915013.52	563531.022	634.432	4.432	WASTE	NAG
2016	PIT	630	N630001	2110						0.36	0.01	7915025.55	563526.112	634.38	4.38	WASTE	NAG
2016	PIT	630	N630001	1913						0.79	0.01	7915019.79	563516.335	636.684	6.684	WASTE	NAG
2016	PIT	630	N630001	1916						0.64	0.01	7915011.12	563511.278	637.639	7.639	WASTE	NAG
2016	PIT	630	N630001	2614						1.06	0.01	7915007.78	563531.209	634.218	4.218	WASTE	NAG
2016	PIT	630	N630001	2015						1.51	0.01	7915014.04	563516.354	636.855	6.855	WASTE	NAG
2016	PIT	630	N630001	1812						0.78	0.01	7915025.36	563515.613	636.293	6.293	WASTE	NAG
2016	PIT	630	N630001	2411						1.8	0.01	7915019.46	563530.604	634.249	4.249	WASTE	NAG
2016	PIT	630	N630001	2515						0.46	0.01	7915004.84	563526.53	635.075	5.075	WASTE	NAG
2016	PIT	630	N630001	2213						0.88	0.01	7915016.24	563522.468	635.836	5.836	WASTE	NAG
2016	PIT	630	N630001	2414						0.61	0.01	7915010.79	563525.953	635.358	5.358	WASTE	NAG
2016	PIT	630	N630001	1815						0.76	0.01	7915016.96	563511.164	637.451	7.451	WASTE	NAG
2016	PIT	630	N630001	2012						0.89	0.01	7915022.77	563521.042	635.573	5.573	WASTE	NAG
2016	PIT	630	N630001	1716						1.08	0.01	7915013.72	563506.177	638.555	8.555	WASTE	NAG
2016	PIT	630	N630001	2509						2.11	0.01	7915022.33	563535.702	632.849	2.849	WASTE	NAG
2016	PIT	630	N630001	1713						0.72	0.01	7915022.53	563510.933	637.332	7.332	WASTE	NAG
2016	PIT	630	N630001	2116						0.57	0.01	7915008.22	563516.332	637.002	7.002	WASTE	NAG
2016	PIT	630	N630001	2611						0.49	0.01	7915016.62	563535.8	633.283	3.283	WASTE	NAG
2016	PIT	630	N630001	1818						0.14	0.04	7915007.94	563506.365	638.785	8.785	WASTE	NAG
2016	PIT	630	N630001	1922						0.09	0.02	7914993.54	563501.885	640.467	10.467	WASTE	NAG
2016	PIT	630	N630001	1821						0.61	0.03	7914999.43	563501.834	640.093	10.093	WASTE	NAG
2016	PIT	630	N630001	1919						0.55	0.01	7915002.31	563506.832	639.09	9.09	WASTE	NAG
2016	PIT	630	N630001	1721						0.84	0.03	7914999.39	563498.549	640.692	10.692	WASTE	NAG
2016	PIT	630	N630001	1809						1.11	0.01	7915034.04	563520.572	634.997	4.997	WASTE	NAG
2016	PIT	630	N630001	1710						0.93	0.01	7915031.1	563515.648	635.897	5.897	WASTE	NAG
2016	PIT	630	N630001	1718						1.05	0.01	7915007.87	563503.142	639.303	9.303	WASTE	NAG
2016	PIT	630	N630001	2204						0.57	0.01	7915042.33	563536.629	632.162	2.5	WASTE	NAG
2016	PIT	630	N630001	1807						1.48	0.01	7915040.34	563523.854	634.238	4.238	WASTE	NAG
2016	PIT	630	N630001	1909						1.09	0.01	7915031.34	563522.564	634.832	4.832	WASTE	NAG
2016	PIT	630	N630001	2608						0.42	0.01	7915025.15	563540.538	631.667	2.5	WASTE	NAG
2016	PIT	630	N630001	1905						0.89	0.01	7915042.9	563528.474	633.365	3.365	WASTE	NAG
2016	PIT	630	N630001	2207						0.93	0.01	7915033.9	563532.125	632.888	2.888	WASTE	NAG
2016	PIT	630	N630001	2408						0.88	0.02	7915028.15	563535.383	632.484	2.5	WASTE	NAG
2016	PIT	630	N630001	2006						0.73	0.01	7915040.08	563530.339	632.932	2.932	WASTE	NAG
2016	PIT	630	N630001	1607						0.69	0.01	7915042.8	563518.749	635.926	5.926	WASTE	NAG
2016	PIT	630	N630001	2010						0.23	0.01	7915028.23	563524.218	634.669	4.669	WASTE	NAG
2016	PIT	630	N630001	2412						0.48	0.01	7915016.36	563529.006	634.754	4.754	WASTE	NAG
2016	PIT	630	N630001	2122						0.18	0.01	7914990.85	563506.939	639.433	9.433	WASTE	NAG
2016	PIT	630	N630001	2219						0.08	0.01	7914998.89	563513.089	638.099	8.099	WASTE	NAG
2016	PIT	630	N630001	2119						0.69	0.01	7914999.55	563511.825	638.325	8.325	WASTE	NAG
2016	PIT	630	N630001	2120						0.14	0.01	7914996.64	563510.142	638.818	8.818	WASTE	NAG
2016	PIT	630	N630001	2021						0.47	0.07	7914996.71	563506.811	639.429	9.429	WASTE	NAG
2016	PIT	630	N630001	2220						0.15	0.01	7914996.02	563511.492	638.602	8.602	WASTE	NAG
2016	PIT	630	N630001	2420						0.2	0.01	7914993.31	563516.502	637.66	7.66	WASTE	NAG
2016	PIT	630	N630001	2520						0.28	0.01	7914990.42	563518.218	637.284	7.284	WASTE	NAG
2016	PIT	630	N630001	2517						0.26	0.01	7914999.03	563523.099	635.844	5.844	WASTE	NAG
2016	PIT	630	N630001	2618						0.06	0.01	7914996.25	563524.862	635.571	5.571	WASTE	NAG
2016	PIT	630	N630001	2018						0.96	0.02	7915005.43	563511.461	638.111	8.111	WASTE	NAG
2016	PIT	630	N630001	2317						0.68	0.02	7915001.91	563517.899	636.991	6.991	WASTE	NAG
2016	PIT	630	N630001	2322						0.24	0.03	7914987.38	563510.226	639.357	9.357	WASTE	NAG
2016	PIT	630	N630001	2216						0.79	0.01	7915007.61	563517.873	636.794	6.794	WASTE	NAG
2016	PIT	630	N630002	2009						0.13	0.005	7915023.99	563515.103	633.157	3.157	CHLORITE SCHIST	NAG
2016	PIT	630	N630002	2015						0.14	0.04	7915006.59	563505.676	635.004	5.004	CHLORITE SCHIST	NAG
2016	PIT	630	N630002	1508						0.06	0.03	7915032.51	563503.228	635.824	5.824	CHLORITE SCHIST	NAG
2016	PIT	630	N630002	1503						0.34	0.005	7915046.81	563510.56	634.358	4.358	CHLORITE SCHIST	NAG
2016	PIT	630	N630002	1512						0.03	0.005	7915021.07	563496.974	637.969	7.969	CHLORITE SCHIST	NAG
2016	PIT	630	N630002	1405						0.77	0.005	7915043.87	563506.169	634.757	4.757	CHLORITE SCHIST	NAG
2016	PIT	630	N630002	1516						0.04	0.005	7915009.58	563490.517	639.542	9.542	CHLORITE SCHIST	NAG
2016	PIT	630	N630003	1438						0.07	0.19	7914622.82	563358.149	635.628	5.628	WASTE	NAG
2016	PIT	630	N630003	1420						0.06	0.08	7914669.53	563395.197	636.853	6.853	ORE:WASTE (See comments	NAG
2016	PIT	630	N630003	1428						0.04	0.02	7914648.85	563379.008	636.395	6.395	WASTE: CHLORITE SCHIST	NAG
2016	PIT	630	N630003	1421						0.03	0.11	7914666.95	563393.256	636.926	6.926	ORE:WASTE (See comments	NAG
2016	PIT	630	N630003	1427						0.02	0.03	7914651.24	563380.673	636.565	6.565	WASTE	NAG
2016	PIT	630	N630003	1439						0.07	0.08	7914620.39	563356.499	635.508	5.508	WASTE	NAG
2016	PIT	630	N630003	1414						0.06	0.04	7914685.12	563407.508	636.425	6.425	ORE:WASTE (See comments	NAG
2016	PIT	630	N630003	1422						0.02	0.1	7914664.48	563391.149	636.856	6.856	ORE:HEMATITE	NAG
2016	PIT	630	N630003	1437						0.04	0.04	7914625.17	563360.174	635.753	5.753	WASTE:ORE	NAG
2016	PIT	630	N630003	1419						0.15	0.04	7914672.12	563397.286	636.906	6.906	ORE:HEMATITE	NAG
2016	PIT	630	N630003	1418						0.16	0.03	7914674.61	563399.258	636.654	6.654	ORE:WASTE (See comments	NAG
2016	PIT	630	N630003	1423						0.04	0.02	7914661.58	563388.987	636.915	6.915	ORE:HEMATITE	NAG
2016	PIT	630	N630004	1618						0.01	0.03	7914693.09	563382.032	640.536	10.536	WASTE: GREEN SCHIST	NAG
2016	PIT	630	N630004	1209						0.01	0.07	7914708.05	563412.392	640.304	10.304	WASTE: CHLORITE SCHIST	NAG
2016	PIT	630	N630004	1617						0.01	0.04	7914695.92	563384.349	640.661	10.661	WASTE: GREEN SCHIST	NAG
2016	PIT	630	N630004	1615						0.02	0.06	7914701.09	563388.13	640.501	10.501	WASTE: GREEN SCHIST	NAG
2016	PIT	630	N630004	1616						0.03	0.03	7914698.5	563386.229	640.53	10.53	WASTE: GREEN SCHIST	NAG
2016	PIT	630	N630004	1802						0.02	0.13	7914740.12	563410.761	640.592	10.592	ORE:LIMONITE/HEMATITE	NAG
2016	PIT	630	N630004	1607						0.01	0.05	7914722.35	563405.222	640.688	10.688	ORE:WASTE (See comments	NAG
2016	PIT	630	N630004	1611						0.01	0.04	7914711.98	563397.073	640.291	10.291	ORE:WASTE (See comments	NAG
2016	PIT	630	N630004	1612						0.01	0.03	7914709.38	563395.006	640.309	10.309	ORE:HEMATITE/MAG	NAG
2016	PIT	630	N630004	1214						0.01	0.08	7914695.43	563401.362	640.397	10.397	ORE:WASTE (See comments	NAG
2016	PIT	630	N630004	1610						0.01	0.02	7914714.43	563398.973	640.312	10.312	WASTE: GREEN SCHIST	NAG
2016	PIT	630	N630004	1208						0.01	0.06	7914710.64	563414.481	640.381	10.381	ORE:HEMATITE	NAG
2016	PIT	630	N630005	1303						0.005	0.005	7914670.16	563374.939	640.46	10.46	WASTE: CHLORITE SCHIST	NAG
2016	PIT	630	N630005	1304						0.005	0.02	7914667.37	563372.855	640.66	10.66	WASTE: CHLORITE SCHIST	NAG
2016	PIT	630	N630005	1600						0.09	0.05	7914684.66	563371.443	640.379	10.379	ORE:WASTE (See comments	NAG
2016	PIT	630	N630006	1345						0.04	0.04	7914604.99	563341.65	635.75	5.75	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1443						0.07	0.02	7914609.92	563348.411	635.476	5.476	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1348						0.15	0.1	7914597.26	563334.814	635.88	5.88	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1447						0.14	0.05	7914599.63	563340.227	635.729	5.729	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1450						0.2	0.15	7914592.23	563333.445	635.908	5.908	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1444						0.07	0.1	7914607.17	563346.067	635.634	5.634	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1445						0.1	0.07	7914604.79	563343.995	635.504	5.504	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1350						0.39	0.11	7914592.53	563330.894	635.967	5.967	WASTE	NAG
2016	PIT	630	N630006	1346						0.07	0.06	7914602.46	563339.028	635.873	5.873	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1354						0.14	0.06	7914582.69	563322.027	636.108	6.108	WASTE	NAG
2016	PIT	630	N630006	1446						0.1	0.04	7914602.38	563341.879	635.596	5.596	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1449						0.09	0.11	7914594.38	563335.66	635.877	5.877	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1347						0.14	0.1	7914599.68	563336.769	635.764	5.764	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1351						0.09	0.07	7914589.89	563328.807	636.105	6.105	WASTE	NAG
2016	PIT	630	N630006	1352						0.19	0.18	7914587.19	563326.114	636.186	6.186	WASTE	NAG
2016	PIT	630	N630006	1448						0.1	0.04	7914597.1	563337.913	635.709	5.709	WASTE: TILL PAG	NAG
2016	PIT	630	N630006	1250						0.16	0.09	7914595.44	563329.328	636.067	6.067	ORE:WASTE (See comments	NAG
2016	PIT	630	N630006	1251						0.05	0.16	7914591.54	563328.551	636.067	6.067	ORE:WASTE (See comments	NAG
2016	PIT	630	N630007	1012						0.02	0.01	7914637.68	563360.586	641.019	11.019	WASTE: CHLORITE SCHIST	NAG
2016	PIT	630	N630007	1011						0.01	0.01	7914640.76	563363.288	640.921	10.921	ORE/WASTE: MAGNETITE/C	NAG

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	630	N630007	1412						0.005	0.08	7914645.73	563350.926	640.186	10.186	WASTE: CHLORITE SCHIST	NAG
2016	PIT	630	N630008	1508						0.14	0.06	7914631.65	563318.56	640.141	10.141	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	630	N630008	1104						0.06	0.14	7914629.89	563340.663	640.359	10.359	WASTE: CHLORITE SCHIST	NAG
2016	PIT	630	N630008	1302						0.03	0.17	7914618.85	563341.028	640.516	10.516	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	630	N630009	1510						0.01	0.08	7914647.77	563307.059	640.618	10.618	ORE:WASTE (See comments	NAG
2016	PIT	640	N640001	1704						0.49	0.01	7914984.73	563496.963	641.709	2.5	WASTE: TILL/SCHIST	NAG
2016	PIT	640	N640001	1405						0.47	0.01	7914978.58	563502.105	641.476	2.5	CHLORITE SCHIST	NAG
2016	PIT	640	N640001	1806						0.08	0.09	7914979.03	563490.71	643.278	3.278	WASTE	NAG
2016	PIT	640	N640001	1609						0.01	0.1	7914967.58	563491.063	644.586	4.586	CHLORITE SCHIST	NAG
2016	PIT	640	N640001	1607						0.11	0.04	7914973.32	563494.274	643.35	3.35	CHLORITE SCHIST	NAG
2016	PIT	640	N640001	1306						0.01	0.01	7914972.77	563502.245	642.123	2.5	CHLORITE SCHIST	NAG
2016	PIT	640	N640001	1202						0.44	0.06	7914984.38	563511.852	639.094	2.5	WASTE	NAG
2016	PIT	640	N640001	1901						0.33	0.02	7914996.28	563496.729	641.249	2.5	CHLORITE SCHIST	NAG
2016	PIT	640	N640001	1105						0.12	0.05	7914972.91	563508.851	640.966	2.5	CHLORITE SCHIST	NAG
2016	PIT	640	N640001	1103						0.43	0.02	7914978.83	563511.909	639.724	2.5	WASTE: CHLORITE/TILL	NAG
2016	PIT	640	N640001	1204						0.15	0.01	7914978.77	563508.648	640.336	2.5	WASTE	NAG
2016	PIT	640	N640001	1003						0.08	0.01	7914978.83	563515.285	639.159	2.5	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	640	N640001	1409						0.03	0.13	7914966.97	563495.96	643.89	3.89	ORE: MAGNETITE	NAG
2016	PIT	640	N640001	1212						0.04	0.01	7914955.45	563496.264	645.85	5.85	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	640	N640001	1410						0.05	0.06	7914964.11	563494.286	644.543	4.543	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	640	N640001	1315						0.04	0.01	7914944.99	563488.188	648.903	8.903	ORE/WASTE	NAG
2016	PIT	640	N640001	1109						0.02	0.01	7914961.33	563502.443	643.576	3.576	ORE: MAGNETITE/SPECULAR	NAG
2016	PIT	640	N640001	1007						0.11	0.03	7914967.41	563508.883	641.522	2.5	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	640	N640001	1414						0.02	0.01	7914952.72	563488.29	647.708	7.708	ORE: MAGNETITE	NAG
2016	PIT	640	N640001	1107						0.03	0.03	7914967.17	563505.649	642.195	2.5	ORE: MAGNETITE	NAG
2016	PIT	640	N640001	1009						0.04	0.01	7914961.11	563505.867	642.948	2.948	ORE: MAGNETITE/SPECULAR	NAG
2016	PIT	640	N640002	1403						0.02	0.005	7914936.32	563518.572	643.772	3.772	ORE/WASTE: BIF	NAG
2016	PIT	640	N640002	1502						0.02	0.005	7914936.27	563515.269	644.809	4.809	ORE/WASTE: BIF	NAG
2016	PIT	640	N640002	1400						0.005	0.005	7914927.55	563513.771	644.461	4.461	ORE/WASTE: SPECULARITE	NAG
2016	PIT	640	N640002	1501						0.005	0.005	7914933.42	563513.749	645.001	5.001	ORE/WASTE: BIF	NAG
2016	PIT	640	N640002	2009						0.08	0.01	7914961.96	563512.874	640.703	2.5	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	640	N640002	1000						0.005	0.005	7914922.06	563524.004	640.896	2.5	ORE: SPECULARITE	NAG
2016	PIT	640	N640003	1611						0.07	0.05	7914954.59	563474.869	650.028	10.028	WASTE	NAG
2016	PIT	640	N640003	1211						0.11	0.07	7914967.14	563481.073	650.038	10.038	WASTE	NAG
2016	PIT	640	N640003	1810						0.09	0.07	7914944.8	563475.035	650.409	10.409	WASTE	NAG
2016	PIT	640	N640003	2008						0.02	0.04	7914932.96	563479.466	650.384	10.384	ORE/WASTE	NAG
2016	PIT	640	N640003	2009						0.03	0.04	7914934.89	563475.206	650.297	10.297	ORE/WASTE	NAG
2016	PIT	640	N640004	1410						0.01	0.01	7914918	563499.913	649.636	9.636	CHLORITE SCHIST	NAG
2016	PIT	640	N640004	1202						0.05	0.01	7914912.5	563522.288	641.019	2.5	ORE: HEMATITE	NAG
2016	PIT	640	N640004	1008						0.01	0.01	7914925.63	563510.958	645.539	5.539	ORE/WASTE: SPECULARITE	NAG
2016	PIT	640	N640005	3014						0.01	0.02	7914849.96	563503.377	646.723	6.723	ORE/WASTE: SPECULARITE	NAG
2016	PIT	640	N640005	1008						0.02	0.01	7914872.42	563501.9	647.154	7.154	ORE/WASTE: SPECULARITE	NAG
2016	PIT	640	N640005	1032						0.04	0.03	7914799.1	563474.168	646.368	6.368	ORE/WASTE: SPECULARITE	NAG
2016	PIT	640	N640005	2018						0.01	0.01	7914838.56	563497.538	647.494	7.494	ORE/WASTE: SPECULARITE	NAG
2016	PIT	640	N640006	1603						0.02	0.01	7914897.99	563487.058	649.944	9.944	CHLORITE SCHIST	NAG
2016	PIT	640	N640006	1403						0.03	0.02	7914904.64	563490.836	650.049	10.049	CHLORITE SCHIST	NAG
2016	PIT	640	N640006	1003						0.02	0.03	7914918.46	563494.815	650.01	10.01	WASTE	NAG
2016	PIT	640	N640006	1210						0.01	0.01	7914927.39	563465.221	650.524	10.524	ORE/WASTE: MAGNETITE	NAG
2016	PIT	640	N640006	1010						0.01	0.01	7914932.25	563467.871	650.287	10.287	ORE/WASTE: MAGNETITE	NAG
2016	PIT	640	N640007	1407						0.01	0.01	7914885.68	563470.261	650.22	10.22	WASTE	NAG
2016	PIT	640	N640007	1207						0.01	0.01	7914892.24	563473.789	650.13	10.13	WASTE	NAG
2016	PIT	640	N640007	1206						0.01	0.17	7914889.83	563478	650.263	10.263	WASTE	NAG
2016	PIT	640	N640007	1006						0.02	0.01	7914895.64	563480.849	649.946	9.946	WASTE	NAG
2016	PIT	640	N640009	1410						0.08	0.15	7914866.86	563448.775	650.049	10.049	ORE/WASTE	NAG
2016	PIT	640	N640009	1411						0.04	0.19	7914869.22	563444.392	650.281	10.281	ORE/WASTE	NAG
2016	PIT	640	N640009	1009						0.09	0.02	7914876.63	563459.813	650.436	10.436	ORE/WASTE	NAG
2016	PIT	640	N640009	1209						0.005	0.04	7914871.26	563456.884	650.159	10.159	ORE/WASTE	NAG
2016	PIT	640	N640010	1215						0.01	0.14	7914859.07	563423.846	649.852	9.852	WASTE: GREEN SCHIST	NAG
2016	PIT	640	N640010	1412						0.01	0.06	7914845.6	563432.719	649.724	9.724	ORE: MAGNETITE	NAG
2016	PIT	640	N640010	1002						0.02	0.08	7914836.17	563481.017	650.039	10.039	WASTE: GREEN SCHIST	NAG
2016	PIT	640	N640010	1211						0.01	0.14	7914850.01	563440.488	649.922	9.922	ORE/WASTE: MAGNETITE/G	NAG
2016	PIT	640	N640010	1006						0.03	0.09	7914843.4	563464.011	650	10	WASTE: GREEN SCHIST	NAG
2016	PIT	640	N640010	1614						0.01	0.16	7914843.06	563421.392	649.95	9.95	ORE: MAGNETITE	NAG
2016	PIT	640	N640010	1014						0.01	0.06	7914863.18	563431.247	649.723	9.723	ORE/WASTE: SPECULARITE/	NAG
2016	PIT	640	N640010	1413						0.01	0.04	7914847.87	563428.479	649.923	9.923	ORE: MAGNETITE	NAG
2016	PIT	640	N640010	1212						0.01	0.06	7914852.24	563436.31	650.072	10.072	ORE: MAGNETITE	NAG
2016	PIT	640	N640010	1009						0.03	0.04	7914850.48	563451.256	650.213	10.213	WASTE: GREEN SCHIST	NAG
2016	PIT	640	N640011	1314						0.005	0.03	7914829.34	563415.694	650.284	10.284	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1416						0.005	0.03	7914827.75	563409.816	650.521	10.521	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1214						0.005	0.05	7914830.75	563419.71	650.226	10.226	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1415						0.005	0.08	7914825.29	563413.489	650.219	10.219	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1515						0.05	0.13	7914824.61	563408.733	650.13	10.13	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1113						0.03	0.04	7914833.5	563422.986	649.995	9.995	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1315						0.005	0.17	7914831.16	563411.895	650.049	10.049	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1012						0.005	0.06	7914833.4	563431.449	649.885	9.885	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1215						0.005	0.11	7914832.89	563416.31	649.969	9.969	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1313						0.005	0.09	7914826.83	563419.129	650.297	10.297	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1508						0.005	0.08	7914808.54	563437.065	650.053	10.053	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1016						0.02	0.18	7914841.49	563416.292	649.752	9.752	ORE: MAGNETITE/WASTE	NAG
2016	PIT	640	N640011	1615						0.005	0.13	7914820.99	563407.017	649.801	9.801	WASTE	NAG
2016	PIT	640	N640011	1606						0.005	0.01	7914799.69	563445.529	649.75	9.75	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1408						0.005	0.03	7914811.02	563440.582	650.088	10.088	CHLORITE SCHIST	NAG
2016	PIT	640	N640011	1107						0.02	0.16	7914819.52	563448.223	649.74	9.74	ORE: MAGNETITE/WASTE	NAG
2016	PIT	640	N640011	1406						0.005	0.12	7914806.1	563449.045	649.59	9.59	ORE: MAGNETITE	NAG
2016	PIT	640	N640011	1603						0.005	0.03	7914793.27	563456.991	650.036	10.036	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	640	N640011	1613						0.005	0.04	7914816.42	563414.915	650.049	10.049	ORE: MAGNETITE	NAG
2016	PIT	640	N640013	1207						0.02	0.05	7914788.85	563404.922	650.266	10.266	WASTE:GREEN SCH	NAG
2016	PIT	640	N640013	1202						0.04	0.04	7914777.06	563425.759	650.506	10.506	WASTE:GREEN SCH	NAG
2016	PIT	640	N640013	1309						0.42	0.04	7914788.58	563397.514	650.008	10.008	WASTE:GREEN SCH.	NAG
2016	PIT	640	N640013	1208						0.09	0.17	7914790.93	563400.626	650.241	10.241	WASTE:GREEN SCH.	NAG
2016	PIT	640	N640013	1209						0.65	0.12	7914793.23	563396.42	650.302	10.302	WASTE:GREEN SCH.	NAG
2016	PIT	640	N640015	1607						0.1	0.1	7914746.82	563408.51	650.195	10.195	WASTE	NAG
2016	PIT	640	N640016	2702						0.06	0.12	7914735.28	563424.412	644.68	4.68	WASTE: CHLORITE SCHIST	NAG
2016	PIT	640	N640016	1403						0.09	0.02	7914766.41	563442.64	645.46	5.46	ORE/WASTE	NAG
2016	PIT	640	N640016	2903						0.06	0.08	7914731.88	563419.201	645.012	5.012	WASTE: CHLORITE SCHIST	NAG
2016	PIT	640	N640016	1401						0.03	0.07	7914761.99	563449.979	644.453	4.453	ORE/WASTE	NAG
2016	PIT	640	N640017	1012						0.01	0.07	7914766.52	563378.939	650.335	10.335	WASTE: CHLORITE SCHIST	NAG
2016	PIT	640	N640019	1403						0.005	0.05	7914710.58	563380.922	649.722	9.722	WASTE: CHLORITE SCHIST	NAG
2016	PIT	640	N640019	1204						0.01	0.14	7914719.07	563382.654	649.661	9.661	WASTE	NAG
2016	PIT	640	N640019	1200						0.02	0.03	7914708.01	563393.007	649.723	9.723	WASTE	NAG
2016	PIT	640	N640019	1003						0.02	0.03	7914723.66	563387.933	650.05	10.05	ORE/WASTE	NAG
2016	PIT	640	N640019	1404						0.005	0.04	7914714.21	563377.344	649.472	9.472	ORE/WASTE	NAG
2016	PIT	640	N640020	4004						0.005	0.02	7914662.55	563367.376	647.029	7.029	WASTE	NAG
2016	PIT	640	N640020	4003						0.005	0.005	7914665.05	563369.354	646.672	6.672	WASTE	NAG
2016	PIT	640	N640020	4000						0.005	0.005	7914672.79	563375.357	646.946	6.946	WASTE	NAG

Baffinland

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK

YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	640	N640020	5006						0.01	0.01	7914657.63	563359.427	648.288	8.288	ORE: MAGNETITE	NAG
2016	PIT	640	N640020	4001						0.005	0.005	7914670.19	563373.355	646.998	6.998	ORE/WASTE: HEMATITE	NAG
2016	PIT	640	N640021	1203						0.01	0.01	7914693.43	563374.604	649.566	9.566	ORE/WASTE	NAG
2016	PIT	640	N640021	1204						0.01	0.01	7914697.07	563371.155	649.936	9.936	ORE/WASTE	NAG
2016	PIT	640	N640022	1006						0.01	0.01	7914804.09	563385.425	650.429	10.429	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	1007						0.01	0.02	7914800.19	563382.488	650.505	10.505	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	204						0.01	0.01	7914781.61	563363.33	650.101	10.101	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	203						0.01	0.03	7914784.29	563366.236	650.146	10.146	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	206						0.06	0.01	7914776.28	563357.873	650.073	10.073	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	207						0.04	0.01	7914773.87	563355.44	650.044	10.044	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	1005						0.07	0.18	7914807.24	563389.536	650.593	10.593	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	1009						0.01	0.03	7914794.8	563376.508	650.41	10.41	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	202						0.04	0.06	7914787.03	563368.891	650.289	10.289	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	1008						0.4	0.02	7914797.08	563379.179	650.669	10.669	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	201						0.12	0.02	7914789.66	563371.828	650.409	10.409	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	1205						0.01	0.19	7914802.19	563393.492	650.557	10.557	ORE/WASTE	NAG
2016	PIT	640	N640022	200						0.01	0.05	7914792.7	563374.785	650.455	10.455	CHLORITE SCHIST	NAG
2016	PIT	640	N640022	1001						0.01	0.1	7914820.29	563401.313	650.411	10.411	ORE/WASTE	NAG
2016	PIT	640	N640022	1210						0.11	0.13	7914785.03	563377.773	650.726	10.726	ORE/WASTE	NAG
2016	PIT	640	N640022	205						0.4	0.02	7914778.76	563360.274	650.067	10.067	ORE/WASTE	NAG
2016	PIT	640	N640022	1414						0.53	0.09	7914767.54	563367.43	650.133	10.133	ORE: MAGNETITE/HEMATIT	NAG
2016	PIT	640	N640022	1206						0.02	0.14	7914798.25	563391.294	650.544	10.544	ORE/WASTE	NAG
2016	PIT	640	N640022	1413						0.85	0.12	7914771.72	563371.776	650.176	10.176	ORE: MAGNETITE	NAG
2016	PIT	640	N640022	1412						0.54	0.15	7914774.76	563374.259	650.137	10.137	ORE: MAGNETITE	NAG
2016	PIT	640	N640025	206						0.01	0.07	7914882.22	563417.131	650.249	10.249	ORE/WASTE	NAG
2016	PIT	640	N640025	1100						0.01	0.05	7914849.78	563412.33	650.051	10.051	WASTE	NAG
2016	PIT	640	N640025	104						0.01	0.03	7914874.18	563410.215	650.434	10.434	ORE: SPECULARITE	NAG
2016	PIT	640	N640028	109						0.27	0.01	7914987.04	563471.032	647.656	7.656	WASTE	NAG
2016	PIT	640	N640028	1404						0.08	0.01	7914989.33	563483.808	642.702	2.702	WASTE	NAG
2016	PIT	640	N640028	1203						0.07	0.01	7914995.55	563480.251	643.403	3.403	WASTE	NAG
2016	PIT	640	N640028	1208	1	12	6.3	6	1.92	0.07	0.2	7914980.63	563472.26	647.019	7.019	WASTE	NAG
2016	PIT	640	N640028	104						0.3	0.02	7914996.01	563475.652	646.565	6.565	WASTE	NAG
2016	PIT	640	N640028	1205						0.12	0.1	7914989.15	563476.796	646.073	6.073	WASTE	NAG
2016	PIT	640	N640029	4029						0.03	0.06	7914601.22	563312.416	645.825	5.825	ORE/WASTE	NAG
2016	PIT	640	N640029	4028						0.05	0.09	7914603.94	563314.272	646.411	6.411	WASTE	NAG
2016	PIT	640	N640029	4024						0.03	0.06	7914614.44	563321.864	647.31	7.31	WASTE	NAG
2016	PIT	640	N640030	1405	1	10	55.6	-46	0.18	4.9	0.01	7914641.41	563315.919	649.709	9.709	CHLORITE SCHIST	NAG
2016	PIT	640	N640030	1406	1	-1	25.9	-27	-0.04	8.25	0.02	7914644.8	563312.712	649.928	9.928	WASTE	NAG
2016	PIT	640	N640030	1204	1	2	15.3	-13	0.13	17.75	0.01	7914643.2	563324.812	649.977	9.977	ORE: MAGNETITE	NAG
2016	PIT	640	N640030	1203						20.1	0.01	7914639.81	563327.841	650.031	10.031	CHLORITE SCHIST	NAG
2016	PIT	640	N640031	1003						0.03	0.08	7914631.92	563312.926	649.778	9.778	CHLORITE SCHIST/ORE	NAG
2016	PIT	640	N640031	1508						0.02	0.12	7914634.4	563284.12	650.08	10.08	WASTE: GREEN SCHIST	NAG
2016	PIT	640	N640031	1404						0.04	0.04	7914622.19	563301.785	650.221	10.221	ORE:WASTE (See comments	NAG
2016	PIT	640	N640033	1414						0.01	0.13	7914674.58	563280.37	650.269	10.269	ORE:HEMATITE	NAG
2016	PIT	640	N640033	1306						0.04	0.09	7914696.43	563309.001	649.913	9.913	ORE:WASTE (See comments	NAG
2016	PIT	640	N640034	1214						0.005	0.04	7914632.18	563269.388	650.366	10.366	WASTE: CHLORITE SCHIST	NAG
2016	PIT	640	N640034	1407						0.05	0.04	7914603.73	563286.009	650.137	10.137	ORE:WASTE (See comments	NAG
2016	PIT	640	N640036	1505						0.03	0.03	7914580.56	563269.65	650.051	10.051	ORE:HEMATITE/MAG	NAG
2016	PIT	640	N640036	1206						0.04	0.08	7914590.12	563276.21	650.039	10.039	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	640	N640037	1113						0.005	0.05	7914620.29	563239.243	650.383	10.383	ORE:WASTE (See comments	NAG
2016	PIT	640	N640037	1112						0.005	0.05	7914623.34	563242.919	650.45	10.45	ORE:WASTE (See comments	NAG
2016	PIT	640	N640037	1213						0.005	0.03	7914624.66	563238.276	650.246	10.246	ORE:WASTE (See comments	NAG
2016	PIT	640	N640037	1215						0.005	0.05	7914619.84	563232.919	650.292	10.292	ORE:WASTE (See comments	NAG
2016	PIT	640	N640037	1011						0.005	0.04	7914623.48	563246.379	650.73	10.73	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	640	N640038	1404						0.05	0.05	7914566.83	563256.125	649.79	9.79	ORE:LIMONITE/HEMATITE	NAG
2016	PIT	640	N640039	1205						0.01	0.16	7914557.45	563242.039	650.237	10.237	ORE:WASTE (See comments	NAG
2016	PIT	640	N640039	1006						0.02	0.04	7914570.03	563239.428	650.009	10.009	ORE:WASTE (See comments	NAG
2016	PIT	640	N640039	1404						0.12	0.09	7914552.37	563236.853	650.286	10.286	ORE:WASTE (See comments	NAG
2016	PIT	640	N640040	1401						0.01	0.03	7914527.51	563227.437	649.709	9.709	ORE:MAGNETITE	NAG
2016	PIT	640	N640040	1206						0.06	0.12	7914546.24	563220.301	649.835	9.835	WASTE	NAG
2016	PIT	640	N640040	1701						0.1	0.03	7914519.45	563219.582	649.886	9.886	ORE/WASTE: MAGNETITE/G	NAG
2016	PIT	650	N650004	1410						0.04	0.11	7914866.45	563442.758	659.876	9.876	WASTE/GREEN SCH.	NAG
2016	PIT	650	N650004	1602						0.005	0.03	7914841.96	563467.17	659.706	9.706	GREEN SCH.	NAG
2016	PIT	650	N650004	1108						0.02	0.03	7914874.02	563455.202	659.845	9.845	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650004	1712						0.04	0.06	7914862.1	563425.535	660.209	10.209	ORE/WASTE/GREEN SCH	NAG
2016	PIT	650	N650004	1209						0.01	0.03	7914871.38	563451.112	659.966	9.966	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650004	1403						0.005	0.03	7914852.14	563466.667	660.106	10.106	ORE/GREEN SCH	NAG
2016	PIT	650	N650004	1611						0.005	0.06	7914861.59	563434.512	660.105	10.105	ORE: SPECULARITE	NAG
2016	PIT	650	N650004	1308						0.005	0.05	7914866.84	563450.947	659.905	9.905	ORE/GREEN SCH	NAG
2016	PIT	650	N650005	1411	1	12	6.9	5	1.75	3.19	0.01	7914839.94	563427.375	660.218	10.218	GREEN SCH.	NAG
2016	PIT	650	N650005	1310	1	13	11.6	1	1.12	3.41	0.03	7914841.67	563431.48	660.12	10.12	GREEN SCH.	NAG
2016	PIT	650	N650005	1210	1	12	9.7	2	1.24	3.5	0.02	7914844.05	563434.696	660.026	10.026	GREEN SCH.	NAG
2016	PIT	650	N650005	1311	1	17	10.9	6	1.55	2.54	0.02	7914844.08	563427.436	660.091	10.091	GREEN SCH.	NAG
2016	PIT	650	N650005	1412	1	15	24.7	-10	0.61	6.44	0.01	7914842.18	563423.406	660.143	10.143	GREEN SCH.	NAG
2016	PIT	650	N650005	1409	1	18	24.1	-6	0.75	4.83	0.01	7914834.76	563435.776	660.058	10.058	GREEN SCH.	NAG
2016	PIT	650	N650005	1014						0.12	0.09	7914859.2	563421.644	660.344	10.344	GREEN SCH.	NAG
2016	PIT	650	N650005	1410	1	11	22.5	-12	0.49	10.9	0.02	7914837.81	563430.784	660.178	10.178	GREEN SCH.	NAG
2016	PIT	650	N650005	1114						0.03	0.05	7914857.96	563418.919	660.269	10.269	GREEN SCH.	NAG
2016	PIT	650	N650005	1211						14.85	0.01	7914846.13	563431.366	660.087	10.087	GREEN SCH.	NAG
2016	PIT	650	N650005	1212						0.01	0.01	7914848.58	563427.281	660.119	10.119	GREEN SCH.	NAG
2016	PIT	650	N650005	1108						0.09	0.16	7914842.37	563444.67	659.897	9.897	GREEN SCH.	NAG
2016	PIT	650	N650005	1309	1	11	28.8	-18	0.38	16.1	0.01	7914839.53	563434.74	659.952	9.952	GREEN SCH.	NAG
2016	PIT	650	N650005	1413						0.02	0.14	7914845.02	563418.89	659.947	9.947	GREEN SCH.	NAG
2016	PIT	650	N650005	1313						0.02	0.02	7914849.15	563419.173	659.948	9.948	GREEN SCH.	NAG
2016	PIT	650	N650005	1215						0.28	0.06	7914856.11	563414.941	660.192	10.192	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650005	1205						0.07	0.19	7914832.51	563453.82	660.062	10.062	ORE/WASTE: BIF	NAG
2016	PIT	650	N650005	1111						0.01	0.04	7914850.45	563431.268	660.144	10.144	GREEN SCH.	NAG
2016	PIT	650	N650005	1003						0.05	0.04	7914835.03	563460.704	659.965	9.965	GREEN SCH.	NAG
2016	PIT	650	N650005	1414						0.06	0.01	7914847.18	563415.271	659.922	9.922	GREEN SCH.	NAG
2016	PIT	650	N650005	1312						0.01	0.03	7914846.65	563423.376	660.027	10.027	ORE: HEMATITE	NAG
2016	PIT	650	N650006	1413						0.01	0.01	7914829.33	563409.245	660.195	10.195	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1414						0.005	0.1	7914831.43	563405.15	660.228	10.228	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1111						2.17	0.02	7914834.47	563421.824	660.342	10.342	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1311						0.01	0.03	7914828.12	563417.83	660.25	10.25	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1212						0.01	0.02	7914832.61	563417.775	660.292	10.292	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1412						0.01	0.02	7914826.9	563412.77	660.211	10.211	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1312						0.03	0.02	7914830.65	563413.701	660.214	10.214	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1110	1	12	6.3	6	1.92	2.82	0.01	7914832.39	563425.044	660.335	10.335	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1313						0.005	0.04	7914832.98	563409.454	660.278	10.278	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1011						0.03	0.11	7914835.44	563424.031	660.389	10.389	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1315						0.005	0.14	7914837.98	563401.28	660.083	10.083	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1316						0.02	0.05	7914839.34	563398.506	660.024	10.024	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1115						0.01	0.01	7914844.22	563405.532	659.91	9.91	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1211	1	10	7.8	2	1.28	4.64	0.01	7914829.82	563421.825	660.32	10.32	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650006	1416						0.03	0.11	7914836.22	563397.56	660.08	10.08	ORE/WASTE: SPECULARITE	NAG

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	650	N650006	1016						0.01	0.18	7914847.87	563404.48	659.985	9.985	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1317						0.01	0.19	7914841.55	563395.433	659.94	9.94	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1013						0.01	0.16	7914840.57	563416.807	660.258	10.258	ORE: SPECULARITE	NAG
2016	PIT	650	N650006	1015						0.01	0.02	7914845.45	563408.073	659.978	9.978	ORE: SPECULARITE	NAG
2016	PIT	650	N650006	1206						10.1	0.01	7914817.5	563442.303	659.594	9.594	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1305						0.01	0.06	7914814.19	563440.731	659.5	9.5	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1406						0.01	0.09	7914811.01	563438.503	659.433	9.433	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1205						0.03	0.08	7914816.53	563443.632	659.58	9.58	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1417						0.005	0.005	7914838.45	563393.765	659.955	9.955	ORE: SPECULARITE	NAG
2016	PIT	650	N650006	1105						0.01	0.05	7914820.41	563444.644	659.636	9.636	ORE: SPECULARITE	NAG
2016	PIT	650	N650006	1117						0.02	0.01	7914847.44	563399.315	659.883	9.883	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650006	1405						0.01	0.01	7914810.08	563440.083	659.442	9.442	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650008	1308						0.005	0.005	7914842.4	563475.545	653.658	3.658	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650008	1009						0.02	0.005	7914838.77	563483.782	653.186	3.186	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650008	1007						0.03	0.02	7914833.3	563480.559	652.981	2.981	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650008	1312						0.03	0.005	7914853.08	563483.086	653.346	3.346	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650008	1307						0.005	0.01	7914839.49	563474.041	653.694	3.694	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650008	1105						0.03	0.15	7914830.64	563475.261	652.556	2.556	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650008	1019						0.16	0.03	7914830.08	563481.907	652.601	2.601	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650008	1011						0.06	0.02	7914844.77	563487.44	653.327	3.327	ORE: SPECULARITE	NAG
2016	PIT	650	N650008	1010						0.06	0.005	7914841.6	563485.343	653.304	3.304	ORE: SPECULARITE	NAG
2016	PIT	650	N650008	1121						0.13	0.04	7914824.67	563481.022	652.034	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650008	1104						0.05	0.07	7914828.2	563472.768	652.467	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650008	1013						0.02	0.005	7914850.74	563489.657	652.756	2.756	ORE: SPECULARITE	NAG
2016	PIT	650	N650008	1220						0.2	0.04	7914827.6	563483.275	652.36	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650008	1016						0.1	0.03	7914857.75	563495.289	650.627	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650008	1221						0.07	0.04	7914830.43	563483.891	652.456	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650008	1111						0.02	0.005	7914847.22	563486.135	653.411	3.411	ORE: SPECULARITE	NAG
2016	PIT	650	N650008	1012						0.06	0.06	7914847.68	563489.208	652.997	2.997	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650008	1018						0.05	0.01	7914833.01	563483.225	652.577	2.577	ORE: SPECULARITE	NAG
2016	PIT	650	N650008	1008						0.01	0.005	7914835.8	563482.31	653.166	3.166	ORE: SPECULARITE	NAG
2016	PIT	650	N650008	1411						0.005	0.005	7914850.32	563477.816	653.817	3.817	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650008	1106						0.005	0.005	7914833.45	563477.276	652.96	2.96	ORE: SPECULARITE	NAG
2016	PIT	650	N650009	1014						0.02	0.06	7914825.13	563402.253	660.067	10.067	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	5015						0.005	0.16	7914817.37	563391.89	660.11	10.11	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	3014						0.01	0.12	7914821.06	563400.163	660.256	10.256	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	2014						0.005	0.08	7914825.83	563399.429	659.95	9.95	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	1013						0.02	0.08	7914822.9	563406.626	660.005	10.005	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	2013						0.03	0.11	7914823.55	563403.732	660.383	10.383	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	3015						0.005	0.18	7914823.87	563395.497	660.222	10.222	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	4016						0.005	0.08	7914824.43	563387.507	660.186	10.186	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	1015						0.005	0.08	7914827.92	563397.522	660.105	10.105	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650009	3016						0.005	0.15	7914826.17	563392.012	660.259	10.259	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	2015						0.005	0.17	7914828.15	563395.57	660.092	10.092	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	5016						0.005	0.1	7914820.01	563387.543	660.335	10.335	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	3008						0.01	0.13	7914806.24	563425.013	659.506	9.506	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	2007						0.01	0.01	7914808.12	563428.243	659.459	9.459	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	1007						0.005	0.01	7914809.67	563430.312	659.433	9.433	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	2016						0.005	0.19	7914830.91	563391.66	659.779	9.779	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650009	5004						0.04	0.005	7914793.07	563432.951	659.52	9.52	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	4007						0.02	0.01	7914802.66	563423.479	659.776	9.776	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650009	3005						0.005	0.005	7914800.29	563434.88	659.197	9.197	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650009	3003						0.005	0.005	7914797.47	563439.943	659.408	9.408	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650009	4003						0.01	0.005	7914795.3	563436.825	659.865	9.865	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650009	4013						0.01	0.15	7914816.78	563399.96	660.068	10.068	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650009	5011						0.005	0.1	7914808.08	563407.699	660.163	10.163	ORE: HEMATITE	NAG
2016	PIT	650	N650009	4001						0.04	0.005	7914791.56	563441.835	659.551	9.551	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650009	3004						0.04	0.03	7914799.13	563436.812	659.615	9.615	GREEN SCH.	NAG
2016	PIT	650	N650009	5008						0.005	0.08	7914799.92	563420.648	659.581	9.581	GREEN SCH.	NAG
2016	PIT	650	N650010	1416						0.05	0.04	7914798.72	563374.429	660.038	10.038	GREEN SCH.	NAG
2016	PIT	650	N650010	1016						0.01	0.03	7914810.73	563381.919	660.001	10.001	GREEN SCH.	NAG
2016	PIT	650	N650010	1115						0.02	0.05	7914806.11	563382.3	659.891	9.891	GREEN SCH.	NAG
2016	PIT	650	N650010	1216						0.03	0.05	7914804.25	563377.974	659.98	9.98	GREEN SCH.	NAG
2016	PIT	650	N650010	7015						0.05	0.13	7914811.17	563388.05	659.953	9.953	WASTE	NAG
2016	PIT	650	N650010	1014						0.01	0.18	7914805.49	563390.378	659.786	9.786	GREEN SCH.	NAG
2016	PIT	650	N650010	1315						0.06	0.09	7914799.74	563378.765	660.144	10.144	ORE/WASTE	NAG
2016	PIT	650	N650010	7013						0.005	0.14	7914806.28	563396.258	659.917	9.917	ORE: HEMATITE	NAG
2016	PIT	650	N650010	1212						0.01	0.08	7914794.89	563394.969	659.899	9.899	ORE/GREEN SCH.	NAG
2016	PIT	650	N650010	1111						0.005	0.18	7914796.45	563398.483	659.928	9.928	ORE/GREEN SCH.	NAG
2016	PIT	650	N650010	1109						0.02	0.04	7914791.1	563406.971	660.095	10.095	WASTE: GREEN SCH.	NAG
2016	PIT	650	N650010	1311						0.005	0.11	7914790.01	563394.67	659.924	9.924	ORE/GREEN SCH.	NAG
2016	PIT	650	N650010	7003						0.005	0.005	7914783.95	563433.191	660.15	10.15	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650010	7009						0.01	0.06	7914796.13	563412.651	659.728	9.728	ORE/WASTE	NAG
2016	PIT	650	N650010	6008						0.005	0.04	7914798.53	563416.293	660.15	10.15	ORE: HEMATITE	NAG
2016	PIT	650	N650011	1010						1.54	0.005	7914979.14	563444.005	651.02	2.5	WASTE	NAG
2016	PIT	650	N650011	1206						0.41	0.005	7914970.12	563432.5	652.969	2.969	WASTE	NAG
2016	PIT	650	N650011	2008						1.04	0.005	7914986.94	563415.315	653.538	3.538	WASTE	NAG
2016	PIT	650	N650011	1208						0.62	0.005	7914976.07	563435.846	652.143	2.5	WASTE	NAG
2016	PIT	650	N650011	1204						0.3	0.005	7914964.34	563429.43	654.077	4.077	WASTE	NAG
2016	PIT	650	N650011	1606						0.74	0.005	7914975.78	563422.343	653.576	3.576	WASTE	NAG
2016	PIT	650	N650011	1808						1.42	0.005	7914984.11	563420.475	653.258	3.258	WASTE	NAG
2016	PIT	650	N650011	1006						0.64	0.005	7914967.63	563437.545	652.598	2.598	WASTE	NAG
2016	PIT	650	N650011	1004						0.35	0.005	7914961.64	563434.745	653.011	3.011	WASTE	NAG
2016	PIT	650	N650011	1806						0.87	0.005	7914978.39	563417.407	653.92	3.92	WASTE	NAG
2016	PIT	650	N650011	1210						1.22	0.005	7914981.88	563438.729	651.367	2.5	WASTE	NAG
2016	PIT	650	N650011	1008						1.66	0.005	7914973.73	563440.36	651.801	2.5	WASTE	NAG
2016	PIT	650	N650011	1404						0.69	0.005	7914967.01	563424.353	654.473	4.473	WASTE	NAG
2016	PIT	650	N650011	1406						0.29	0.005	7914972.87	563427.521	653.35	3.35	WASTE	NAG
2016	PIT	650	N650011	2208						0.49	0.005	7914989.57	563410.253	653.808	3.808	WASTE	NAG
2016	PIT	650	N650011	1610						0.83	0.005	7914987.2	563428.702	652.135	2.5	WASTE	NAG
2016	PIT	650	N650011	1608						1.36	0.005	7914981.5	563425.499	652.809	2.809	WASTE	NAG
2016	PIT	650	N650011	1410						0.63	0.005	7914984.69	563433.616	651.702	2.5	WASTE	NAG
2016	PIT	650	N650011	1408						0.81	0.01	7914978.8	563430.575	652.489	2.5	WASTE	NAG
2016	PIT	650	N650011	1812						0.71	0.005	7914995.74	563426.684	651.787	2.5	WASTE	NAG
2016	PIT	650	N650011	2012						1.5	0.005	7914998.59	563421.362	652.134	2.5	WASTE	NAG
2016	PIT	650	N650011	1810						0.96	0.01	7914990.14	563423.459	652.47	2.5	WASTE	NAG
2016	PIT	650	N650011	2212						1.56	0.005	7915001.51	563416.403	652.379	2.5	WASTE	NAG
2016	PIT	650	N650011	2010						1.36	0.005	7914992.86	563418.323	652.89	2.89	WASTE	NAG
2016	PIT	650	N650011	2210						1.01	0.005	7914995.46	563413.391	653.114	3.114	WASTE	NAG
2016	PIT	650	N650012	1416						0.02	0.005	7914787	563363.882	660.194	10.194	GREEN SCH.	NAG
2016	PIT	650	N650012	1616						0.1	0.01	7914781.87	563358.552	660.459	10.459	GREEN SCH.	NAG
2016	PIT	650	N650012	1216						0.05	0.005	7914792.42	563368.404	660.254	10.254	GREEN SCH.	NAG
2016	PIT	650	N650012	1715						0.02	0.03	7914776.45	563360.368	660.386	10.386	GREEN SCH.	NAG
2016	PIT	650	N650012	1115						0.06	0.005	7914795.2	563370.889	660.122	10.122	GREEN SCH.	NAG
2016	PIT	650	N650012	1515						0.09	0.03	7914782.32	563364.836	660.346	10.346	WASTE	NAG

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2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	650	N650012	1513						0.13	0.13	7914777.24	563372.037	660.212	10.212	ORE: HEMATITE	NAG
2016	PIT	650	N650012	1711						0.1	0.02	7914767.05	563376.153	660.6	10.6	ORE/GREEN SCH.	NAG
2016	PIT	650	N650012	1414						0.04	0.07	7914782.13	563371.987	660.154	10.154	ORE/GREEN SCH.	NAG
2016	PIT	650	N650013	1015						0.02	0.005	7914775.58	563353.446	660.138	10.138	WASTE	NAG
2016	PIT	650	N650013	1503						0.08	0.02	7914732.02	563389.513	659.756	9.756	ORE/WASTE	NAG
2016	PIT	650	N650014	1417						0.01	0.01	7914762.27	563339.469	659.998	9.998	WASTE	NAG
2016	PIT	650	N650014	1316						0.06	0.01	7914762.02	563343.742	660.182	10.182	WASTE	NAG
2016	PIT	650	N650014	1517						0.06	0.01	7914761.24	563335.955	659.862	9.862	WASTE	NAG
2016	PIT	650	N650014	1114						0.03	0.08	7914759.8	563355.092	660.52	10.52	WASTE	NAG
2016	PIT	650	N650014	1117						0.02	0.02	7914769.13	563345.688	660.083	10.083	WASTE	NAG
2016	PIT	650	N650014	1317						0.04	0.02	7914765.04	563342.113	659.924	9.924	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650014	1304						0.05	0.06	7914722.06	563383.242	660.137	10.137	WASTE	NAG
2016	PIT	650	N650014	1717						0.05	0.03	7914754.44	563331.263	659.847	9.847	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650014	1315						0.11	0.04	7914759.31	563347.373	660.29	10.29	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650014	1513						0.02	0.17	7914747.39	563348.735	660.091	10.091	ORE	NAG
2016	PIT	650	N650014	1505						0.07	0.11	7914718.41	563375.534	659.801	9.801	ORE	NAG
2016	PIT	650	N650014	1113						0.04	0.13	7914756.21	563358.452	660.636	10.636	ORE	NAG
2016	PIT	650	N650014	1313						0.02	0.16	7914752.27	563352.526	660.419	10.419	ORE	NAG
2016	PIT	650	N650014	1704						0.02	0.01	7914711.18	563373.039	659.73	9.73	ORE	NAG
2016	PIT	650	N650015	1216						0.01	0.02	7914746.92	563328.458	660.01	10.01	WASTE	NAG
2016	PIT	650	N650015	1417						0.01	0.01	7914744.16	563320.455	660.006	10.006	WASTE	NAG
2016	PIT	650	N650016	207						0.11	0.05	7914927.63	563422.83	659.97	9.97	WASTE	NAG
2016	PIT	650	N650016	1206						0.01	0.01	7914924.68	563439.444	659.754	9.754	WASTE	NAG
2016	PIT	650	N650016	1406						0.05	0.01	7914928.22	563432.044	659.6	9.6	WASTE	NAG
2016	PIT	650	N650016	1405						0.06	0.02	7914932.54	563434.58	659.527	9.527	WASTE	NAG
2016	PIT	650	N650016	208						0.53	0.02	7914930.78	563425.037	659.759	9.759	ORE/WASTE	NAG
2016	PIT	650	N650016	1507						0.11	0.04	7914923.92	563424.871	659.921	9.921	WASTE	NAG
2016	PIT	650	N650016	1502						0.1	0.03	7914942.47	563434.061	659.591	9.591	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650016	210						0.23	0.03	7914937.8	563428.456	659.552	9.552	ORE/WASTE	NAG
2016	PIT	650	N650016	1408						0.01	0.17	7914919.79	563427.617	659.972	9.972	WASTE	NAG
2016	PIT	650	N650016	1204						0.03	0.02	7914932.49	563442.963	659.647	9.647	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650016	1302						0.03	0.07	7914938.26	563439.403	659.6875	9.6875	WASTE	NAG
2016	PIT	650	N650016	209						0.09	0.04	7914934.33	563426.541	659.577	9.577	ORE/WASTE	NAG
2016	PIT	650	N650016	1207						0.01	0.15	7914920.1	563436.997	659.819	9.819	WASTE	NAG
2016	PIT	650	N650016	1404						0.52	0.01	7914936.9	563437.004	659.566	9.566	ORE/WASTE	NAG
2016	PIT	650	N650016	211						0.37	0.03	7914941.16	563430.644	659.308	9.308	ORE/WASTE	NAG
2016	PIT	650	N650016	1209						0.01	0.19	7914912.31	563432.413	660.266	10.266	WASTE	NAG
2016	PIT	650	N650016	212						0.07	0.08	7914944.1	563431.729	659.3945	9.3945	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650016	1403						0.09	0.08	7914939.68	563437.496	659.641	9.641	ORE/WASTE	NAG
2016	PIT	650	N650016	1303						0.01	0.02	7914936.63	563441.855	659.726	9.726	ORE/WASTE: SPECULARITE	NAG
2016	PIT	650	N650016	1205						0.01	0.04	7914928.49	563441.54	659.605	9.605	ORE	NAG
2016	PIT	650	N650017	1418						0.04	0.04	7914722.89	563298.947	660.334	10.334	ORE/WASTE	NAG
2016	PIT	650	N650017	1413						0.01	0.1	7914706.16	563314.962	659.894	9.894	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650017	1618						0.03	0.05	7914717.98	563293.298	659.998	9.998	ORE/WASTE	NAG
2016	PIT	650	N650017	1218						0.06	0.01	7914728.56	563304.082	660.194	10.194	ORE/WASTE: HEMATITE/CH	NAG
2016	PIT	650	N650018	1616	1	6	6.3	0	0.96	0.005	0.2	7914647.94	563322.484	660.476	10.476	ORE/WASTE: MAGNETITE	NAG
2016	PIT	650	N650020	1604						0.02	0.07	7914628.27	563303.944	660.562	10.562	ORE/WASTE: MAGNETITE/C	NAG
2016	PIT	650	N650021	2006						0.005	0.005	7914588.34	563266.379	660.189	10.189	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650021	2010						0.03	0.09	7914601.55	563280.502	660.347	10.347	ORE: MAGNETITE/HEMATIT	NAG
2016	PIT	650	N650021	1908						0.01	0.02	7914591.47	563273.255	660.596	10.596	ORE: HEMATITE	NAG
2016	PIT	650	N650021	2004						0.01	0.03	7914581.07	563260	660.161	10.161	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650022	111						0.005	0.06	7914910.05	563408.143	660.814	10.814	WASTE	NAG
2016	PIT	650	N650022	109						0.005	0.14	7914914.64	563411.545	660.739	10.739	WASTE	NAG
2016	PIT	650	N650022	209						0.005	0.06	7914905.99	563408.864	660.919	10.919	WASTE	NAG
2016	PIT	650	N650022	1505						0.005	0.12	7914907.51	563414.096	660.793	10.793	WASTE	NAG
2016	PIT	650	N650022	113						0.005	0.07	7914904.47	563404.974	660.811	10.811	WASTE	NAG
2016	PIT	650	N650022	1502						0.005	0.005	7914920.52	563421.794	660.057	10.057	WASTE	NAG
2016	PIT	650	N650022	203						0.02	0.01	7914925.99	563420.302	659.748	9.748	WASTE	NAG
2016	PIT	650	N650022	211						0.01	0.08	7914899.09	563404.2	660.977	10.977	WASTE	NAG
2016	PIT	650	N650022	115						0.02	0.08	7914899.52	563401.678	660.838	10.838	WASTE	NAG
2016	PIT	650	N650022	205						0.13	0.08	7914919.28	563417.923	660.208	10.208	WASTE	NAG
2016	PIT	650	N650022	1212						0.005	0.01	7914876.11	563407.649	660.508	10.508	ORE/WASTE: MAGNETITE LI	NAG
2016	PIT	650	N650022	1104						0.005	0.17	7914904.59	563427.807	660.387	10.387	ORE/WASTE: MAGNETITE	NAG
2016	PIT	650	N650023	1605						0.01	0.03	7914631.62	563267.923	660.369	10.369	CHLORITE SCHIST	NAG
2016	PIT	650	N650023	1503						0.01	0.11	7914635.29	563275.215	660.144	10.144	CHLORITE SCHIST	NAG
2016	PIT	650	N650023	1705						0.01	0.05	7914634.39	563265.014	660.33	10.33	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650024	1625						0.02	0.01	7914621.17	563201.11	660.706	10.706	ORE/WASTE: MAGNETITE	NAG
2016	PIT	650	N650024	1724						0.02	0.02	7914623.9	563198.59	660.465	10.465	ORE/WASTE: MAGNETITE	NAG
2016	PIT	650	N650025	2015						0.06	0.06	7914615.8	563227.049	660.65	10.65	WASTE	NAG
2016	PIT	650	N650025	1913						0.01	0.04	7914618.8	563236.31	660.809	10.809	ORE: HEMATITE	NAG
2016	PIT	650	N650025	1115						0.36	0.03	7914589.99	563252.256	660.155	10.155	ORE: HEMATITE	NAG
2016	PIT	650	N650026B	1023						0.03	0.03	7914685	563374.4	651.878	1.878	WASTE	NAG
2016	PIT	650	N650026B	1543						0.01	0.005	7914698	563384.6	650.835	0.835	ORE/WASTE: HEMATITE/TIL	NAG
2016	PIT	650	N650027	1402						0.005	0.14	7914855.83	563386.247	660.491	10.491	WASTE	NAG
2016	PIT	650	N650027	1314						0.005	0.17	7914800.34	563366.077	660.307	10.307	ORE/WASTE	NAG
2016	PIT	650	N650027	1417						0.005	0.005	7914792.3	563358.574	660.505	10.505	CHLORITE SCHIST	NAG
2016	PIT	650	N650027	216						0.01	0.11	7914807.03	563361.723	660.367	10.367	ORE/WASTE: MAGNETITE	NAG
2016	PIT	650	N650027	122						0.005	0.13	7914808.68	563359.949	660.507	10.507	ORE/WASTE	NAG
2016	PIT	650	N650028	202	1	8	6.3	2	1.28	0.07	0.2	7914733.64	563289.608	660.07	10.07	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650028	1312						0.03	0.01	7914762.3	563327.986	659.914	9.914	WASTE	NAG
2016	PIT	650	N650028	217						0.09	0.14	7914774.53	563333.015	659.777	9.777	WASTE	NAG
2016	PIT	650	N650028	1411						0.03	0.01	7914758.69	563321.89	659.729	9.729	ORE/WASTE	NAG
2016	PIT	650	N650028	100						0.25	0.09	7914730.34	563283.012	659.902	9.902	ORE: HEMATITE/MAGNETIT	NAG
2016	PIT	650	N650029	2000						0.03	0.05	7914913.74	563401.922	661.127	11.127	WASTE	NAG
2016	PIT	650	N650029	2001						0.12	0.11	7914916.6	563404.431	661.075	11.075	WASTE	NAG
2016	PIT	650	N650029	2003						0.11	0.09	7914923.2	563408.921	660.888	10.888	WASTE	NAG
2016	PIT	650	N650029	6000						0.18	0.08	7914928.55	563398.375	660.837	10.837	WASTE	NAG
2016	PIT	650	N650029	2002						0.13	0.08	7914919.94	563406.655	660.954	10.954	WASTE	NAG
2016	PIT	650	N650029	2004						0.15	0.08	7914926.43	563411.17	660.777	10.777	WASTE	NAG
2016	PIT	650	N650029	3006						0.5	0.04	7914937.6	563414.337	659.964	9.964	WASTE	NAG
2016	PIT	650	N650029	4002						0.29	0.11	7914927.79	563404.692	660.743	10.743	WASTE	NAG
2016	PIT	650	N650029	5000						0.37	0.04	7914924.41	563399.359	661.089	11.089	WASTE	NAG
2016	PIT	650	N650029	5002						0.47	0.04	7914931.37	563403.561	660.69	10.69	WASTE	NAG
2016	PIT	650	N650029	6004						0.37	0.13	7914942.17	563406.562	660.302	10.302	WASTE	NAG
2016	PIT	650	N650029	3000						0.19	0.05	7914917.44	563401.376	661.14	11.14	WASTE	NAG
2016	PIT	650	N650029	3002						0.18	0.04	7914924	563405.85	660.893	10.893	WASTE	NAG
2016	PIT	650	N650029	4004						0.32	0.08	7914934.52	563408.857	660.591	10.591	WASTE	NAG
2016	PIT	650	N650029	1004						0.22	0.06	7914924.08	563411.225	660.849	10.849	WASTE	NAG
2016	PIT	650	N650029	4006						0.61	0.09	7914941.32	563412.847	660	10	WASTE	NAG
2016	PIT	650	N650029	4008						0.52	0.09	7914948.59	563416.478	659.668	9.668	WASTE	NAG
2016	PIT	650	N650029	3004						0.24	0.06	7914930.72	563410.159	660.725	10.725	WASTE	NAG
2016	PIT	650	N650029	5006						0.17	0.09	7914945.16	563411.422	659.993	9.993	WASTE	NAG
2016	PIT	650	N650029	6002						0.4	0.05	7914935.36	563402.572	660.538	10.538	WASTE	NAG
2016	PIT	650	N650029	3008						0.5	0.1	7914944.68	563417.883	659.629	9.629	WASTE	NAG
2016	PIT	650	N650029	5004						0.65	0.11	7914938.15	563407.614	660.483	10.483	WASTE	NAG

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	650	N650029	6006						0.21	0.09	7914949.36	563410.192	659.993	9.993	WASTE	NAG
2016	PIT	650	N650029	2010						0.53	0.08	7914946.78	563421.568	659.532	9.532	WASTE	NAG
2016	PIT	650	N650029	2008						0.15	0.04	7914940.42	563418.992	659.704	9.704	WASTE	NAG
2016	PIT	650	N650029	2006						0.24	0.03	7914933.45	563415.202	660.043	10.043	WASTE	NAG
2016	PIT	650	N650029	4000						0.04	0.11	7914920.92	563400.289	661.165	11.165	WASTE	NAG
2016	PIT	650	N650029	5008						0.07	0.12	7914952.52	563414.881	659.867	9.867	WASTE	NAG
2016	PIT	650	N650031	228	1	3	14.1	-11	0.21	0.45	0.01	7914712.83	563268.234	660.3	10.3	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650031	229						0.42	0.01	7914715.94	563271.082	660.384	10.384	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650031	227	1	2	12.8	-11	0.16	0.91	0.01	7914710.24	563265.479	660.159	10.159	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650031	1223						0.01	0.05	7914701.62	563266.701	659.815	9.815	ORE/WASTE	NAG
2016	PIT	650	N650031	224	1	-3	56.9	-60	-0.05	0.45	0.01	7914701.97	563256.788	659.842	9.842	ORE/WASTE	NAG
2016	PIT	650	N650031	223	1	3	31.6	-29	0.1	0.36	0.01	7914699.3	563254.047	659.968	9.968	ORE/WASTE	NAG
2016	PIT	650	N650031	1217						0.01	0.18	7914682.36	563246.409	660.044	10.044	ORE/WASTE	NAG
2016	PIT	650	N650032	1615						0.01	0.03	7914604.96	563179.847	660.251	10.251	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650032	1600						0.35	0.18	7914553.83	563227.276	659.376	9.376	ORE: HEMATITE	NAG
2016	PIT	650	N650032	1200						0.41	0.2	7914564.28	563238.525	659.75	9.75	ORE: HEMATITE	NAG
2016	PIT	650	N650033	1019						0.005	0.005	7914601.77	563175.83	660.11	10.11	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650033	1419						0.005	0.005	7914592.55	563165.934	660.339	10.339	ORE/WASTE	NAG
2016	PIT	650	N650033	1203						0.69	0.16	7914544.27	563220.77	659.15	9.15	ORE: HEMATITE	NAG
2016	PIT	650	N650037	1411						0.04	0.01	7914555.08	563145.195	660.176	10.176	ORE	NAG
2016	PIT	650	N650039	1411						0.14	0.01	7914537.88	563134.7	660.21	10.21	ORE/WASTE	NAG
2016	PIT	650	N650042	5013						0.11	0.01	7914460.04	563130.46	658.644	8.644	ORE: HEMATITE	NAG
2016	PIT	650	N650042	3017						0.11	0.005	7914446.65	563124.424	658.717	8.717	ORE: HEMATITE/TILL	NAG
2016	PIT	650	N650043	1505						0.09	0.01	7914484.98	563116.922	660.019	10.019	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650043	1506						0.01	0.01	7914488.22	563113.586	660.283	10.283	ORE/WASTE	NAG
2016	PIT	650	N650043	1507						0.11	0.01	7914492.02	563110.953	659.873	9.873	ORE/WASTE	NAG
2016	PIT	650	N650044	1400						0.02	0.005	7914497.85	563186.976	650.616	2.5	WASTE/CHORITE	NAG
2016	PIT	650	N650045	1100						0.005	0.01	7914462.54	563126.664	660.011	10.011	WASTE	NAG
2016	PIT	650	N650046	1003						0.01	0.01	7914439.06	563120.595	658.482	8.482	ORE/WASTE	NAG
2016	PIT	650	N650046	1411						0.005	0.005	7914456.2	563085.471	660.075	10.075	ORE/WASTE: HEMATITE	NAG
2016	PIT	650	N650047	112						0.01	0.02	7914664.12	563213.169	660.161	10.161	GREEN SCHIST	NAG
2016	PIT	650	N650047	113						0.05	0.01	7914666.26	563215.298	660.128	10.128	GREEN SCHIST	NAG
2016	PIT	650	N650047	111						0.05	0.02	7914661.88	563210.934	660.205	10.205	GREEN SCHIST	NAG
2016	PIT	650	N650047	114						0.01	0.02	7914668.08	563217.294	660.132	10.132	GREEN SCHIST	NAG
2016	PIT	650	N650047	1314						0.04	0.06	7914676.63	563235.005	660.098	10.098	GREEN SCHIST	NAG
2016	PIT	650	N650047	115						0.02	0.04	7914670.23	563219.607	660.197	10.197	GREEN SCHIST	NAG
2016	PIT	650	N650047	1313						0.01	0.15	7914673.11	563231.427	660.42	10.42	GREEN SCHIST	NAG
2016	PIT	650	N650047	118						0.02	0.03	7914676.44	563226.006	660.191	10.191	GREEN SCHIST	NAG
2016	PIT	650	N650047	116						0.09	0.06	7914672.17	563221.775	660.326	10.326	GREEN SCHIST	NAG
2016	PIT	650	N650047	117						0.35	0.07	7914674.25	563223.927	660.199	10.199	GREEN SCHIST	NAG
2016	PIT	650	N650047	119						0.1	0.1	7914678.8	563228.248	660.067	10.067	GREEN SCHIST	NAG
2016	PIT	650	N650047	110						0.06	0.16	7914659.77	563208.686	660.341	10.341	GREEN SCHIST	NAG
2016	PIT	650	N650047	1315						0.2	0.08	7914679.98	563238.275	660.159	10.159	GREEN SCHIST	NAG
2016	PIT	650	N650047	120						0.19	0.07	7914680.68	563230.577	659.982	9.982	GREEN SCHIST	NAG
2016	PIT	650	N650047	1114						0.14	0.12	7914671.49	563239.666	660.354	10.354	GREEN SCHIST	NAG
2016	PIT	654	N650047	1306						0.18	0.09	7914650.36	563206.97	660.571	6.571	GREEN SCHIST	NAG
2016	PIT	651	N650047	1303						0.01	0.18	7914640.39	563196.525	660.481	9.481	ORE/WASTE	NAG
2016	PIT	650	N650048	118						0.005	0.03	7914599.65	563145.012	659.24	9.24	WASTE	NAG
2016	PIT	650	N650048	114						0.005	0.005	7914607.86	563153.666	660.036	10.036	WASTE	NAG
2016	PIT	650	N650048	116						0.02	0.02	7914603.63	563149.171	659.438	9.438	WASTE	NAG
2016	PIT	650	N650048	112						0.005	0.09	7914611.87	563158.068	659.86	9.86	WASTE	NAG
2016	PIT	650	N650048	120						0.05	0.14	7914595.17	563140.88	659.767	9.767	WASTE	NAG
2016	PIT	650	N650048	1214						0.005	0.005	7914592.08	563145.821	659.891	9.891	CHLORITE SCHIST	NAG
2016	PIT	650	N650048	1213						0.01	0.005	7914594.67	563149.119	659.997	9.997	WASTE	NAG
2016	PIT	650	N650048	1212						0.005	0.02	7914597.23	563151.401	659.815	9.815	WASTE	NAG
2016	PIT	650	N650048	1410						0.005	0.005	7914598.65	563163.773	659.627	9.627	WASTE	NAG
2016	PIT	650	N650048	1211						0.02	0.005	7914600.74	563155.577	659.991	9.991	WASTE	NAG
2016	PIT	650	N650048	1407						0.005	0.005	7914608.65	563174.244	659.723	9.723	WASTE	NAG
2016	PIT	650	N650048	1411						0.04	0.005	7914595.23	563160.225	659.758	9.758	WASTE	NAG
2016	PIT	650	N650048	1409						0.01	0.005	7914602.28	563167.356	659.869	9.869	ORE/WASTE	NAG
2016	PIT	650	N650048	1408						0.005	0.005	7914605.33	563170.65	659.771	9.771	ORE/WASTE	NAG
2016	PIT	650	N650048	1412						0.02	0.005	7914592.16	563157.111	659.748	9.748	WASTE	NAG
2016	PIT	650	N650048	1210						0.33	0.02	7914604.22	563158.768	659.972	9.972	ORE/WASTE	NAG
2016	PIT	650	N650048	1406						0.01	0.005	7914612.11	563177.378	659.82	9.82	ORE/WASTE	NAG
2016	PIT	650	N650050	1311						0.01	0.01	7914438.2	563075.021	659.995	9.995	CHLORITE SCHIST	NAG
2016	PIT	650	N650050	1510						0.05	0.01	7914430.38	563071.798	659.766	9.766	CHLORITE SCHIST	NAG
2016	PIT	650	N650050	1111						0.01	0.01	7914444.19	563079.484	660.051	10.051	CHLORITE SCHIST	NAG
2016	PIT	650	N650050	1310						0.01	0.01	7914435.11	563077.741	659.868	9.868	ORE/WASTE	NAG
2016	PIT	650	N650050	1302						0.02	0.01	7914408.71	563102.455	658.872	8.872	ORE: HEMATITE	NAG
2016	PIT	650	N650051	109						0.03	0.01	7914567.27	563125.034	659.876	9.876	WASTE	NAG
2016	PIT	650	N650051	111						0.02	0.02	7914562.68	563122.434	659.975	9.975	WASTE	NAG
2016	PIT	650	N650051	106						0.03	0.01	7914575.32	563129.68	659.804	9.804	WASTE	NAG
2016	PIT	650	N650051	115						0.01	0.01	7914551.85	563116.424	660.184	10.184	WASTE	NAG
2016	PIT	650	N650051	116						0.01	0.01	7914549.07	563114.652	659.912	9.912	WASTE	NAG
2016	PIT	650	N650051	110						0.09	0.02	7914565.32	563124.218	659.793	9.793	WASTE	NAG
2016	PIT	650	N650051	104						0.04	0.01	7914579.97	563132.197	659.95	9.95	WASTE	NAG
2016	PIT	650	N650051	103						0.04	0.01	7914583.09	563133.979	659.907	9.907	WASTE	NAG
2016	PIT	650	N650051	114						0.11	0.01	7914554.78	563117.737	659.853	9.853	WASTE	NAG
2016	PIT	650	N650051	112						0.03	0.01	7914559.53	563121.05	660.125	10.125	WASTE	NAG
2016	PIT	650	N650051	1211						0.01	0.01	7914545.75	563119.785	659.839	9.839	WASTE	NAG
2016	PIT	650	N650051	1207						0.02	0.01	7914562.6	563129.117	660.466	10.466	WASTE	NAG
2016	PIT	650	N650051	105						0.05	0.01	7914577.84	563131.116	660.101	10.101	WASTE	NAG
2016	PIT	650	N650051	1209						0.01	0.01	7914554.31	563124.438	660.105	10.105	WASTE	NAG
2016	PIT	650	N650051	108						0.01	0.01	7914569.89	563127.295	659.732	9.732	WASTE	NAG
2016	PIT	650	N650051	102						0.02	0.01	7914585.6	563135.412	659.918	9.918	WASTE	NAG
2016	PIT	650	N650051	113						0.07	0.05	7914557.14	563119.299	659.858	9.858	WASTE	NAG
2016	PIT	650	N650051	1206						0.01	0.01	7914566.55	563131.811	660.243	10.243	WASTE	NAG
2016	PIT	650	N650051	1204						0.07	0.01	7914575.07	563136.314	660.17	10.17	WASTE	NAG
2016	PIT	650	N650051	1210						0.15	0.01	7914549.89	563122.103	660.131	10.131	WASTE	NAG
2016	PIT	650	N650051	1203						0.01	0.01	7914579.29	563138.688	660.02	10.02	WASTE	NAG
2016	PIT	650	N650051	1205						0.01	0.01	7914570.91	563134.015	660.105	10.105	WASTE	NAG
2016	PIT	650	N650051	1212						0.01	0.01	7914541.71	563117.458	660.025	10.025	WASTE	NAG
2016	PIT	650	N650051	1208						0.02	0.01	7914558.37	563126.969	660.206	10.206	WASTE	NAG
2016	PIT	650	N650051	107						0.28	0.01	7914572.67	563128.153	659.55	9.55	WASTE	NAG
2016	PIT	650	N650051	1202						0.02	0.01	7914583.39	563141.045	660.128	10.128	WASTE	NAG
2016	PIT	650	N650051	101						0.01	0.04	7914588.61	563137.037	659.733	9.733	WASTE	NAG
2016	PIT	650	N650051	100						0.01	0.01	7914590.19	563137.952	660.038	10.038	WASTE	NAG
2016	PIT	650	N650051	1201						0.12	0.01	7914585.63	563142.778	659.928	9.928	WASTE	NAG
2016	PIT	650	N650051	1404						0.69	0.01	7914571.36	563142.814	660.239	10.239	WASTE	NAG
2016	PIT	650	N650051	1403						0.05	0.01	7914575.61	563145.392	660.029	10.029	ORE/WASTE	NAG
2016	PIT	650	N650052	1010						0.03	0.01	7914426.9	563068.874	660.046	10.046	WASTE	NAG
2016	PIT	650	N650052	1409						0.03	0.01	7914413.86	563061.146	659.981	9.981	ORE:HEMATITE	NAG
2016	PIT	650	N650052	1209						0.03	0.01	7914419.22	563066.75	659.92	9.92	ORE:HEMATITE	NAG
2016	PIT	650	N650053	1710						0.13	0.01	7914271.04	562994.045	651.105	2.5	ORE:HEMATITE	NAG
2016	PIT	650	N650053	1910						0.03	0.01	7914275.03	562998.505	652.569	2.569	ORE:HEMATITE	NAG

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK

YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	650	N650053	1705						0.01	0.02	7914259.13	563005.371	653.38	3.38	ORE:HEMATITE	NAG
2016	PIT	650	N650054	1210						0.01	0.01	7914399.26	563052.724	659.949	9.949	WASTE	NAG
2016	PIT	650	N650054	1409						0.03	0.01	7914391.72	563049.206	659.98	9.98	WASTE	NAG
2016	PIT	650	N650054	1010						0.18	0.01	7914404.58	563056.804	659.727	9.727	ORE: HEMATITE	NAG
2016	PIT	650	N650054	1209						0.01	0.01	7914396.33	563055.431	659.972	9.972	WASTE	NAG
2016	PIT	650	N650054	1408						0.02	0.01	7914388.52	563052.508	660.135	10.135	WASTE	NAG
2016	PIT	650	N650055	218						0.01	0.01	7914479.04	563078.642	659.929	9.929	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	223						0.01	0.01	7914462	563067.9	650	0	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1118						0.01	0.01	7914462.75	563077.101	660.021	10.021	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	217						0.01	0.01	7914482.43	563079.78	659.798	9.798	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	216						0.01	0.01	7914485.96	563081.713	659.706	9.706	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1114						0.01	0.01	7914479.55	563086.558	659.936	9.936	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	220						0.01	0.01	7914472.37	563073.953	660.021	10.021	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	219						0.01	0.05	7914475.69	563075.315	660.115	10.115	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	224						0.01	0.01	7914458	563065.9	650	0	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1117						0.01	0.01	7914466.72	563079.473	660.019	10.019	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	222						0.1	0.02	7914464.93	563069.773	660.284	10.284	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	226						0.01	0.01	7914451	563062	650	0	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1218						0.01	0.01	7914463.03	563081.711	659.912	9.912	WASTE	NAG
2016	PIT	650	N650055	215						0.01	0.15	7914489.54	563083.459	659.717	9.717	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1116						0.01	0.01	7914471.67	563081.122	660.096	10.096	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	213						0.01	0.01	7914496.37	563087.366	659.993	9.993	WASTE	NAG
2016	PIT	650	N650055	225						0.01	0.04	7914455	563063.9	650	0	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	212						0.01	0.01	7914499.87	563089.638	659.959	9.959	WASTE	NAG
2016	PIT	650	N650055	214						0.01	0.01	7914492.89	563085.506	659.853	9.853	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1115						0.01	0.01	7914475.62	563084.235	659.99	9.99	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	214						0.01	0.01	7914492.89	563085.506	659.853	9.853	WASTE	NAG
2016	PIT	650	N650055	1119						0.01	0.01	7914458.67	563074.857	660.114	10.114	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	202						0.01	0.01	7914534.83	563109.399	659.986	9.986	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1317						0.01	0.01	7914465.33	563083.438	660.173	10.173	WASTE	NAG
2016	PIT	650	N650055	221						0.01	0.1	7914468.56	563071.856	660.036	10.036	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1112						0.01	0.01	7914488.06	563091.302	659.975	9.975	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1114						0.01	0.01	7914479.55	563086.558	659.936	9.936	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	211						0.01	0.01	7914503.91	563091.424	659.957	9.957	WASTE	NAG
2016	PIT	650	N650055	1219						0.01	0.01	7914458.8	563079.121	660.15	10.15	WASTE	NAG
2016	PIT	650	N650055	1113						0.01	0.01	7914484.04	563088.836	659.974	9.974	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	1113						0.01	0.01	7914484.04	563088.836	659.974	9.974	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	208						0.01	0.01	7914513.61	563097.656	660.122	10.122	WASTE	NAG
2016	PIT	650	N650055	1111						0.01	0.01	7914491.96	563093.679	659.937	9.937	WASTE	NAG
2016	PIT	650	N650055	204						0.01	0.01	7914527.2	563105.909	660.168	10.168	WASTE	NAG
2016	PIT	650	N650055	205						0.01	0.01	7914523.67	563104.103	660.05	10.05	WASTE	NAG
2016	PIT	650	N650055	207						0.01	0.03	7914517.09	563099.466	660.13	10.13	WASTE	NAG
2016	PIT	650	N650055	209						0.01	0.02	7914509.82	563095.345	659.885	9.885	WASTE	NAG
2016	PIT	650	N650055	1109						0.01	0.01	7914500.54	563098.286	659.835	9.835	WASTE	NAG
2016	PIT	650	N650055	1318						0.01	0.01	7914461	563082.8	650	0	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650055	210						0.01	0.01	7914506.33	563094.128	659.847	9.847	WASTE	NAG
2016	PIT	650	N650055	1010						0.01	0.01	7914500.12	563093.951	659.874	9.874	WASTE	NAG
2016	PIT	650	N650055	206						0.01	0.01	7914520.63	563101.463	660.138	10.138	WASTE	NAG
2016	PIT	650	N650055	1316						0.01	0.01	7914468.22	563085.736	660.004	10.004	WASTE	NAG
2016	PIT	650	N650055	203						0.01	0.01	7914531.1	563107.363	660.241	10.241	WASTE	NAG
2016	PIT	650	N650055	1108						0.01	0.06	7914504.41	563101.129	659.894	9.894	WASTE	NAG
2016	PIT	650	N650055	1110						0.01	0.01	7914496.32	563096.004	659.856	9.856	WASTE	NAG
2016	PIT	650	N650055	1315						0.01	0.01	7914472.55	563089.443	660.048	10.048	WASTE	NAG
2016	PIT	650	N650055	1107						0.01	0.01	7914508.79	563103.135	660.038	10.038	WASTE	NAG
2016	PIT	650	N650055	1314						0.01	0.01	7914476.69	563091.625	660.128	10.128	WASTE	NAG
2016	PIT	650	N650055	1101						0.01	0.01	7914531.5	563115.931	659.987	9.987	ORE:WASTE	NAG
2016	PIT	650	N650055	1103						0.04	0.01	7914525.47	563112.556	659.892	9.892	ORE:WASTE	NAG
2016	PIT	650	N650055	1102						0.01	0.01	7914528.54	563114.539	659.969	9.969	WASTE	NAG
2016	PIT	650	N650055	1104						0.01	0.01	7914521.23	563110.16	659.925	9.925	ORE:WASTE	NAG
2016	PIT	650	N650055	1313						0.03	0.01	7914480.84	563093.263	660.072	10.072	WASTE	NAG
2016	PIT	650	N650055	1105						0.01	0.01	7914517.09	563107.822	659.997	9.997	ORE:WASTE	NAG
2016	PIT	650	N650055	1312						0.01	0.01	7914484.63	563095.681	660.25	10.25	WASTE	NAG
2016	PIT	650	N650056	1706						0.16	0.01	7914309.63	562999.065	655.645	5.645	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1709						0.01	0.01	7914316.77	562992.326	655.195	5.195	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1708						0.01	0.01	7914314.23	562994.641	655.141	5.141	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1509						0.01	0.01	7914307.91	562992.664	654.473	4.473	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1610						0.19	0.01	7914313.83	562991.377	654.759	4.759	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1511						0.01	0.01	7914312.86	562988.081	653.946	3.946	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1210						0.02	0.01	7914301.2	562987.298	652.364	2.5	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	2000						0.09	0.005	7914314.28	563006.521	658.24	8.24	WASTE	NAG
2016	PIT	650	N650056	1608						0.01	0.01	7914308.94	562995.883	654.74	4.74	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1309						0.01	0.01	7914301.75	562990.728	653.265	3.265	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1311						0.01	0.01	7914306.37	562986.304	652.762	2.762	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1612						0.01	0.01	7914317.83	562987.702	654.2	4.2	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1809						0.02	0.01	7914319.83	562993.329	656.017	6.017	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1408						0.08	0.01	7914302.72	562993.642	653.923	3.923	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	2002						0.01	0.01	7914319.1	563002.032	658.073	8.073	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1804						0.18	0.005	7914308.22	563004.552	657.288	7.288	WASTE	NAG
2016	PIT	650	N650056	1606						0.05	0.01	7914304.21	563000.517	655.487	5.487	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1406						0.22	0.04	7914297.65	562998.47	654.264	4.264	WASTE: TILL	NAG
2016	PIT	650	N650056	1208						0.11	0.01	7914296.17	562991.597	652.424	2.5	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	2001						0.13	0.005	7914316.72	563004.279	658.198	8.198	WASTE	NAG
2016	PIT	650	N650056	1109						0.08	0.01	7914295.15	562988.695	651.692	2.5	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1212						0.33	0.01	7914305.72	562982.857	652.196	2.5	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1710						0.01	0.01	7914318.78	562990.541	655.135	5.135	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1410						0.01	0.01	7914307.2	562989.289	653.599	3.599	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1604						0.12	0.02	7914299.11	563004.788	656.06	6.06	WASTE: TILL	NAG
2016	PIT	650	N650056	1407						0.21	0.11	7914300.01	562996.174	653.964	3.964	WASTE: TILL	NAG
2016	PIT	650	N650056	1007						0.07	0.005	7914287.39	562992.018	651.742	2.5	ORE/WASTE: HEMATITE/GN	NAG
2016	PIT	650	N650056	1412						0.01	0.02	7914312.52	562984.835	653.298	3.298	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1805						0.01	0.01	7914310.2	563002.344	656.772	6.772	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1111						0.06	0.01	7914299.73	562983.782	651.658	2.5	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1405						0.33	0.05	7914295.01	563000.413	654.449	4.449	WASTE: TILL	NAG
2016	PIT	650	N650056	1207						0.67	0.02	7914293.54	562994.193	652.728	2.728	WASTE: TILL	NAG
2016	PIT	650	N650056	1906						0.23	0.01	7914318.27	562999.192	656.986	6.986	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1800						0.09	0.02	7914298.66	563013.426	658.286	8.286	WASTE: TILL	NAG
2016	PIT	650	N650056	1012						0.5	0.01	7914299.3	562980.444	651.559	2.5	ORE:WASTE (See comments	NAG
2016	PIT	650	N650056	1803						0.18	0.005	7914305.43	563006.906	657.619	7.619	WASTE	NAG
2016	PIT	650	N650056	1404						0.06	0.07	7914292.87	563002.463	655.055	5.055	WASTE: TILL	NAG
2016	PIT	650	N650056	1908						0.01	0.01	7914323.25	562994.259	656.811	6.811	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1205						0.08	0.02	7914288.56	562998.315	653.528	3.528	WASTE: TILL	NAG
2016	PIT	650	N650056	1010						0.34	0.01	7914294.35	562985.508	651.052	2.5	WASTE	NAG
2016	PIT	650	N650056	1006						0.17	0.01	7914284.92	562994.291	652.156	2.5	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650056	1802						0.15	0.02	7914303.08	563009.086	658.08	8.08	WASTE: TILL	NAG
2016	PIT	650	N650056	1403						0.12	0.03	7914290.5	563005.093	655.149	5.149	WASTE: TILL	NAG

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	650	N650056	1004						0.27	0.02	7914280.19	562998.65	652.896	2.896	WASTE: TILL	NAG
2016	PIT	650	N650056	1005						0.12	0.01	7914282.34	562996.564	652.611	2.611	WASTE: TILL	NAG
2016	PIT	650	N650056	1204						0.14	0.02	7914286.05	563000.559	653.79	3.79	WASTE: TILL	NAG
2016	PIT	650	N650056	1602						0.33	0.02	7914294.28	563009.114	656.867	6.867	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650056	1603						0.09	0.07	7914296.57	563006.979	656.632	6.632	WASTE: TILL	NAG
2016	PIT	650	N650056	1402						0.09	0.04	7914288.31	563007.076	655.458	5.458	WASTE: TILL	NAG
2016	PIT	650	N650056	1801						0.04	0.02	7914300.62	563011.134	658.126	8.126	WASTE: TILL	NAG
2016	PIT	650	N650056	1203						1.57	0.02	7914283.88	563003.054	654.149	4.149	ORE:WASTE (See comments	NAG
2016	PIT	650	N650056	1700						0.37	0.01	7914295.44	563012.418	657.699	7.699	ORE/WASTE: HEMATITE/Till	NAG
2016	PIT	650	N650056	1900						0.07	0.01	7914303.81	563012.358	658.71	8.71	ORE/WASTE: HEMATITE/Till	NAG
2016	PIT	650	N650058	1210						0.005	0.005	7914377.7	563040.893	659.69	9.69	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650058	1409						0.005	0.005	7914370.75	563036.952	659.645	9.645	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650058	1209						0.005	0.005	7914374.92	563042.896	659.585	9.585	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650058	1010						0.005	0.005	7914383.91	563043.615	659.884	9.884	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650058	1408						0.03	0.005	7914367.23	563040.069	659.546	9.546	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650058	1009						0.005	0.005	7914380.23	563046.02	660.059	10.059	WASTE: SILICIFIED GRANITE	NAG
2016	PIT	650	N650058	1208						0.01	0.05	7914372.49	563045.452	659.589	9.589	ORE:LIMONITE/HEMATITE	NAG
2016	PIT	650	N650058	1407						0.005	0.005	7914363.71	563043.042	659.444	9.444	ORE:LIMONITE/HEMATITE	NAG
2016	PIT	650	N650059	115						0.02	0.06	7914423.53	563043.335	659.835	9.835	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1002						0.02	0.01	7914454.02	563066.888	660.118	10.118	WASTE: GNEISS	NAG
2016	PIT	650	N650059	113						0.07	0.05	7914428.22	563046.203	659.478	9.478	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1206						0.01	0.005	7914433.44	563063.683	659.887	9.887	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1204						0.01	0.005	7914442.68	563067.968	660.176	10.176	WASTE: GNEISS	NAG
2016	PIT	650	N650059	109						0.02	0.1	7914438.99	563052.592	659.576	9.576	WASTE: GNEISS	NAG
2016	PIT	650	N650059	107						0.01	0.02	7914444.52	563055.312	659.556	9.556	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1209						0.02	0.005	7914420.72	563057.708	659.935	9.935	WASTE: GNEISS	NAG
2016	PIT	650	N650059	117						0.02	0.005	7914417.46	563039.892	659.964	9.964	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1205						0.03	0.005	7914438.77	563065.611	660.031	10.031	WASTE: GNEISS	NAG
2016	PIT	650	N650059	105						0.01	0.03	7914449.5	563058.306	660.084	10.084	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1210						0.01	0.07	7914416.94	563055.203	659.943	9.943	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1212						0.23	0.04	7914408.35	563050.903	660.174	10.174	WASTE: GNEISS	NAG
2016	PIT	650	N650059	111						0.02	0.13	7914433.81	563049.701	659.641	9.641	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1208						0.02	0.005	7914424.85	563060.05	659.966	9.966	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1207						0.03	0.02	7914429.28	563062.515	659.913	9.913	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1211						0.01	0.06	7914412.79	563052.68	659.949	9.949	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1203						0.02	0.02	7914447.26	563070.781	660.264	10.264	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1011						0.005	0.01	7914416.74	563046.476	660.004	10.004		NAG
2016	PIT	650	N650059	1005						0.005	0.005	7914441.47	563060.175	659.913	9.913	WASTE: GNEISS	NAG
2016	PIT	650	N650059	202						0.005	0.005	7914454.21	563063.784	660.113	10.113	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1107						0.005	0.005	7914428.77	563057.509	659.583	9.583	WASTE: GNEISS	NAG
2016	PIT	650	N650059	209						0.005	0.005	7914429.58	563049.693	659.712	9.712	WASTE: GNEISS	NAG
2016	PIT	650	N650059	204						0.005	0.005	7914446.57	563059.534	660.058	10.058	WASTE: GNEISS	NAG
2016	PIT	650	N650059	207						0.005	0.07	7914436.51	563053.666	659.701	9.701	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1003						0.01	0.005	7914449.78	563064.822	660.137	10.137	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1111						0.005	0.04	7914414.1	563049.012	659.779	9.779	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1103						0.005	0.005	7914445.56	563067.217	660.185	10.185	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1009						0.005	0.04	7914424.54	563050.608	659.928	9.928	WASTE: GNEISS	NAG
2016	PIT	650	N650059	211						0.005	0.04	7914422.57	563045.726	660.136	10.136	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1109						0.005	0.01	7914420.33	563052.979	659.977	9.977	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1007						0.01	0.14	7914432.42	563055.689	659.615	9.615	WASTE: GNEISS	NAG
2016	PIT	650	N650059	1105						0.01	0.005	7914437.46	563062.427	659.953	9.953	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1311						0.02	0.005	7914353.52	563030.66	659.509	9.509	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1411						0.005	0.03	7914349.9	563028.89	659.27	9.27	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1310						0.02	0.005	7914351.16	563032.724	659.473	9.473	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1111						0.005	0.005	7914359.98	563032.946	659.536	9.536	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1112						0.005	0.005	7914362.29	563031.273	659.344	9.344	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1312						0.04	0.005	7914356.33	563029.008	659.358	9.358	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1211						0.01	0.005	7914357.22	563034.297	659.52	9.52	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1309						0.03	0.005	7914348.64	563035.129	659.645	9.645	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1412						0.01	0.005	7914352.58	563026.54	659.281	9.281	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650060	1610						0.03	0.005	7914341.68	563025.776	659.302	9.302	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650060	1509						0.02	0.01	7914342.72	563029.996	659.436	9.436	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650060	1210						0.01	0.01	7914353.03	563037.374	659.45	9.45	WASTE: GNEISS	NAG
2016	PIT	650	N650060	1510						0.01	0.005	7914346.23	563027.201	659.301	9.301	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650060	1511						0.02	0.005	7914348.99	563024.757	659.019	9.019	WASTE: CHLORITE SCHIST	NAG
2016	PIT	650	N650060	1409						0.02	0.01	7914343.55	563034.547	659.636	9.636	ORE:WASTE (See comments	NAG
2016	PIT	650	N650060	1508						0.03	0.04	7914338.98	563033.731	659.384	9.384	ORE:HEMATITE	NAG
2016	PIT	650	N650060	1608						0.05	0.03	7914334.61	563032.387	659.216	9.216	ORE:WASTE (See comments	NAG
2016	PIT	650	N650061	1810						0.09	0.02	7914304.84	563017.425	659.079	9.079	ORE:WASTE (See comments	NAG
2016	PIT	650	N650061	1010						0.28	0.03	7914286.08	563031.525	654.957	4.957	WASTE	NAG
2016	PIT	650	N650061	1302						0.1	0.01	7914267	563017.588	654.546	4.546	ORE:WASTE (See comments	NAG
2016	PIT	650	N650061	1410						0.21	0.01	7914294.44	563025.544	657.511	7.511	ORE/WASTE: HEMATITE/Till	NAG
2016	PIT	650	N650061	1306						0.16	0.01	7914279.56	563022.337	655.831	5.831	ORE/WASTE: HEMATITE/Till	NAG
2016	PIT	650	N650061	1106						0.26	0.02	7914277.1	563024.546	655.399	5.399	ORE/WASTE: HEMATITE/Till	NAG
2016	PIT	650	N650061	1708						0.14	0.01	7914295.27	563017.827	658.165	8.165	ORE:MAGNETITE	NAG
2016	PIT	650	N650061	1108						0.15	0.02	7914283.01	563027.486	655.666	5.666	ORE:HEMATITE	NAG
2016	PIT	650	N650061	1104						0.08	0.01	7914270.9	563022.201	654.784	4.784	ORE/WASTE: HEMATITE/Till	NAG
2016	PIT	650	N650061	1500						0.005	0.01	7914266.38	563011.507	654.254	4.254	ORE:HEMATITE	NAG
2016	PIT	650	N650063	1221						0.03	0.01	7914370.54	563029.285	659.509	9.509	WASTE	NAG
2016	PIT	650	N650063	1222						0.02	0.01	7914366.26	563026.969	659.645	9.645	WASTE	NAG
2016	PIT	650	N650063	1318						0.01	0.04	7914380.72	563034.636	659.516	9.516	WASTE	NAG
2016	PIT	650	N650063	1220						0.01	0.01	7914375.02	563031.128	659.447	9.447	WASTE	NAG
2016	PIT	650	N650063	1214						0.01	0.01	7914399.2	563043.668	660.049	10.049	WASTE	NAG
2016	PIT	650	N650063	1112						0.01	0.01	7914403.78	563044.461	660.051	10.051	WASTE	NAG
2016	PIT	650	N650063	1215						0.01	0.01	7914395.63	563043.429	660.104	10.104	WASTE	NAG
2016	PIT	650	N650063	1217						0.02	0.01	7914387.96	563038.237	659.882	9.882	WASTE	NAG
2016	PIT	650	N650063	1218						0.02	0.01	7914383.43	563035.455	659.754	9.754	WASTE	NAG
2016	PIT	650	N650063	1223						0.02	0.01	7914362.1	563024.566	659.328	9.328	WASTE	NAG
2016	PIT	650	N650063	1216						0.01	0.01	7914391.25	563041.388	660.134	10.134	WASTE	NAG
2016	PIT	650	N650063	1219						0.03	0.04	7914378.63	563033.154	659.471	9.471	WASTE	NAG
2016	PIT	650	N650063	1317						0.01	0.05	7914385.36	563036.942	659.793	9.793	WASTE	NAG
2016	PIT	650	N650063	127						0.05	0.01	7914392.62	563025.668	660.003	10.003	WASTE	NAG
2016	PIT	650	N650063	128						0.01	0.01	7914389.76	563024.279	660.075	10.075	WASTE	NAG
2016	PIT	650	N650063	120						0.01	0.01	7914411.17	563036.009	659.77	9.77	WASTE	NAG
2016	PIT	650	N650063	130						0.06	0.01	7914384.78	563021.32	659.679	9.679	WASTE	NAG
2016	PIT	650	N650063	119						0.01	0.01	7914413.6	563036.946	659.627	9.627	WASTE	NAG
2016	PIT	650	N650063	121						0.02	0.01	7914408.78	563034.057	659.671	9.671	WASTE	NAG
2016	PIT	650	N650063	126						0.01	0.01	7914395.09	563027.255	659.817	9.817	WASTE	NAG
2016	PIT	650	N650063	124						0.01	0.04	7914400.18	563030.329	659.681	9.681	WASTE	NAG
2016	PIT	650	N650063	1114						0.02	0.01	7914399.54	563041.287	659.979	9.979	WASTE	NAG
2016	PIT	650	N650063	1116						0.18	0.04	7914391.27	563036.526	660.007	10.007	WASTE	NAG
2016	PIT	650	N650063	1118						0.01	0.02	7914382.6	563031.469	659.559	9.559	WASTE	NAG
2016	PIT	650	N650063	1120						0.01	0.01	7914374.49	563027.002	659.474	9.474	WASTE	NAG
2016	PIT	650	N650063	1122						0.03	0.01	7914366.66	563022.783	659.466	9.466	WASTE	NAG
2016	PIT	650	N650063	1121						0.01	0.01	7914370.17	563024.738	659.489	9.489	WASTE	NAG

Baffinland

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK

YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	650	N650063	223						0.07	0.01	7914380.47	563022.788	659.714	9.714	WASTE	NAG
2016	PIT	650	N650063	1016						0.02	0.03	7914395.1	563034.369	659.812	9.812	WASTE	NAG
2016	PIT	650	N650063	1018						0.02	0.03	7914386.71	563030.158	659.96	9.96	WASTE	NAG
2016	PIT	650	N650063	1020						0.01	0.01	7914378.38	563024.974	659.594	9.594	WASTE	NAG
2016	PIT	650	N650063	1019						0.01	0.02	7914382.56	563027.291	659.738	9.738	WASTE	NAG
2016	PIT	650	N650063	1017						0.02	0.04	7914390.97	563031.922	659.997	9.997	WASTE	NAG
2016	PIT	650	N650063	1022						0.03	0.01	7914369.99	563020.229	659.516	9.516	WASTE	NAG
2016	PIT	650	N650063	225						0.02	0.01	7914373.59	563017.696	659.816	9.816	WASTE	NAG
2016	PIT	650	N650063	1015						0.03	0.05	7914399.42	563036.706	659.64	9.64	WASTE	NAG
2016	PIT	650	N650063	218						0.06	0.01	7914397.83	563031.996	659.771	9.771	WASTE	NAG
2016	PIT	650	N650063	215						0.02	0.01	7914408.67	563037.862	659.912	9.912	WASTE	NAG
2016	PIT	650	N650063	220						0.01	0.02	7914391.06	563027.915	660.091	10.091	WASTE	NAG
2016	PIT	660	N660030	1014						0.03	0.01	7914549.97	563138.27	667.536	7.536	ORE/WASTE: BIF	NAG
2016	PIT	660	N660030	1113						0.04	0.01	7914546.54	563136.691	667.694	7.694	ORE/WASTE: BIF	NAG
2016	PIT	660	N660030	1214						0.05	0.01	7914544.4	563132.648	667.732	7.732	ORE/WASTE: BIF	NAG
2016	PIT	660	N660030	1413						0.01	0.01	7914536.39	563128.454	667.604	7.604	ORE/WASTE: BIF	NAG
2016	PIT	660	N660030	1313						0.06	0.01	7914540.63	563130.223	667.732	7.732	ORE/WASTE: BIF	NAG
2016	PIT	660	N660030	1213						0.03	0.03	7914541.82	563134.88	667.795	7.795	ORE/WASTE: BIF	NAG
2016	PIT	660	N660032	231						0.01	0.01	7914602.6	563144.759	667.472	7.472	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	145						0.01	0.01	7914601.71	563141.618	667.41	7.41	GREEN SCH.	NAG
2016	PIT	660	N660032	229						0.01	0.01	7914606.39	563148.659	667.767	7.767	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	143						0.01	0.01	7914604.38	563144.433	667.545	7.545	GREEN SCH.	NAG
2016	PIT	660	N660032	232						0.01	0.02	7914600.65	563142.973	667.358	7.358	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	139						0.01	0.01	7914609.94	563150.251	667.766	7.766	GREEN SCH.	NAG
2016	PIT	660	N660032	234						0.01	0.01	7914597.3	563139.31	667.365	7.365	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	228						0.01	0.02	7914608.26	563150.883	667.713	7.713	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	230						0.01	0.01	7914604.46	563146.919	667.562	7.562	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	137						0.5	0.07	7914612.56	563153.099	667.705	7.705	GREEN SCH.	NAG
2016	PIT	660	N660032	147						0.07	0.01	7914598.91	563138.625	667.354	7.354	GREEN SCH.	NAG
2016	PIT	660	N660032	227						0.01	0.04	7914610.05	563152.913	667.695	7.695	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	233						0.01	0.01	7914598.74	563140.867	667.345	7.345	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	141						0.02	0.01	7914607.24	563147.33	667.654	7.654	GREEN SCH.	NAG
2016	PIT	660	N660032	1319						0.07	0.01	7914598.25	563145.443	667.255	7.255	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	103						0.06	0.08	7914659.41	563202.512	667.434	7.434	GREEN SCH.	NAG
2016	PIT	660	N660032	1318						0.04	0.03	7914601.42	563148.907	667.411	7.411	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	101						0.25	0.06	7914662.12	563205.393	667.456	7.456	GREEN SCH.	NAG
2016	PIT	660	N660032	1205						0.12	0.18	7914643.01	563198.844	667.392	7.392	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	1320						0.09	0.11	7914594.91	563141.897	667.246	7.246	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	1317						0.05	0.05	7914604.85	563152.389	667.818	7.818	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	1016						0.06	0.01	7914611.86	563176.659	666.963	6.963	GREEN SCH.	NAG
2016	PIT	660	N660032	1206						0.01	0.1	7914639.71	563195.378	667.405	7.405	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	1207						0.05	0.15	7914636.34	563191.862	667.236	7.236	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	1203						0.14	0.18	7914649.52	563205.9	667.33	7.33	GREEN SCH.	NAG
2016	PIT	660	N660032	135						0.07	0.03	7914614.9	563155.321	667.668	7.668	GREEN SCH.	NAG
2016	PIT	660	N660032	1013						0.05	0.02	7914609.57	563173.985	667.288	7.288	GREEN SCH.	NAG
2016	PIT	660	N660032	1315						0.07	0.16	7914611.46	563159.289	667.895	7.895	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	1014						0.03	0.02	7914608.16	563172.337	667.441	7.441	GREEN SCH.	NAG
2016	PIT	660	N660032	1316						0.09	0.16	7914608.18	563155.845	667.852	7.852	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	133						0.02	0.07	7914617.55	563158.088	667.757	7.757	GREEN SCH.	NAG
2016	PIT	660	N660032	1221						0.03	0.01	7914591.33	563144.903	667.304	7.304	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	1220						0.01	0.01	7914594.24	563147.292	667.247	7.247	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	1015						0.04	0.03	7914606.2	563169.14	667.866	7.866	ORE: HEMATITE	NAG
2016	PIT	660	N660032	226						0.02	0.1	7914611.84	563154.817	667.778	7.778	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	1020						0.005	0.01	7914589.87	563151.128	667.607	7.607	GREEN SCH.	NAG
2016	PIT	660	N660032	1219						0.03	0.02	7914596.84	563149.983	667.393	7.393	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	213						0.01	0.17	7914636.55	563180.89	666.871	6.871	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660032	1117						0.005	0.02	7914598.83	563157.854	668.057	8.057	GREEN SCH.	NAG
2016	PIT	660	N660032	1116						0.005	0.03	7914601.9	563161.416	668.188	8.188	ORE: HEMATITE	NAG
2016	PIT	660	N660032	1019						0.005	0.02	7914592.81	563153.239	667.553	7.553	GREEN SCH.	NAG
2016	PIT	660	N660032	214						0.02	0.15	7914634.69	563178.913	666.941	6.941	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	1021						0.005	0.01	7914587.46	563148.983	667.578	7.578	ORE: HEMATITE	NAG
2016	PIT	660	N660032	132						0.03	0.11	7914618.63	563159.784	667.695	7.695	ORE/WASTE	NAG
2016	PIT	660	N660032	1218						0.01	0.02	7914600.18	563153.471	667.814	7.814	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	225						0.02	0.13	7914613.96	563156.971	667.72	7.72	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	1308						0.02	0.16	7914634.52	563183.773	667.073	7.073	ORE: HEMATITE	NAG
2016	PIT	660	N660032	1209						0.02	0.15	7914629.83	563184.759	667.024	7.024	ORE: HEMATITE	NAG
2016	PIT	660	N660032	1313						0.18	0.07	7914618	563166.215	667.475	7.475	ORE: HEMATITE	NAG
2016	PIT	660	N660032	1012						0.02	0.01	7914614.96	563179.319	666.846	6.846	GREEN SCH.	NAG
2016	PIT	660	N660032	1118						0.005	0.02	7914595.41	563154.64	667.548	7.548	ORE: HEMATITE	NAG
2016	PIT	660	N660032	1115						0.01	0.04	7914605.27	563165.107	668.061	8.061	ORE: HEMATITE	NAG
2016	PIT	660	N660032	1307						0.06	0.16	7914637.78	563187.184	667.183	7.183	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660032	1208						0.01	0.18	7914633	563188.282	667.27	7.27	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	5005						0.01	0.01	7914705.13	563269.588	667.689	7.689	WASTE	NAG
2016	PIT	660	N660033	1045						0.03	0.03	7914670.54	563214.259	667.522	7.522	WASTE	NAG
2016	PIT	660	N660033	1044						0.01	0.03	7914671.75	563215.664	667.7	7.7	WASTE	NAG
2016	PIT	660	N660033	1043						0.01	0.04	7914673.16	563217.017	667.82	7.82	WASTE	NAG
2016	PIT	660	N660033	3004						0.01	0.08	7914713.45	563267.196	667.671	7.671	WASTE	NAG
2016	PIT	660	N660033	5016						0.02	0.12	7914670.78	563232.93	668.121	8.121	WASTE	NAG
2016	PIT	660	N660033	5015						0.01	0.07	7914673.42	563236.232	667.912	7.912	WASTE	NAG
2016	PIT	660	N660033	5006						0.01	0.01	7914702.87	563268.157	667.45	7.45	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	4017						0.01	0.12	7914669.66	563226.933	668.069	8.069	ORE: HEMATITE	NAG
2016	PIT	660	N660033	4005						0.05	0.08	7914707.82	563267.901	667.772	7.772	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	1012						0.01	0.11	7914715.98	563262.362	667.604	7.604	ORE: HEMATITE	NAG
2016	PIT	660	N660033	4006						0.01	0.07	7914706.31	563265.743	667.942	7.942	ORE: HEMATITE	NAG
2016	PIT	660	N660033	5014						0.01	0.07	7914676.12	563240.162	667.769	7.769	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	5008						0.01	0.05	7914695.43	563261.865	667.326	7.326	ORE: HEMATITE	NAG
2016	PIT	660	N660033	2015						0.01	0.14	7914694.61	563242.241	667.946	7.946	ORE: HEMATITE	NAG
2016	PIT	660	N660033	1025						0.01	0.16	7914698.25	563243.223	668.057	8.057	ORE: HEMATITE	NAG
2016	PIT	660	N660033	2017						0.01	0.13	7914690.06	563237.603	668.024	8.024	ORE: HEMATITE	NAG
2016	PIT	660	N660033	1028						0.005	0.13	7914693.93	563238.77	668.25	8.25	ORE: HEMATITE	NAG
2016	PIT	660	N660033	4007						0.01	0.03	7914702.39	563261.676	667.603	7.603	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	4012						0.03	0.11	7914685.98	563244.376	667.86	7.86	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	4010						0.05	0.16	7914692.68	563251.736	667.916	7.916	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	4011						0.01	0.12	7914689.26	563247.877	667.68	7.68	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	4014						0.01	0.06	7914679.33	563237.466	667.846	7.846	WASTE	NAG
2016	PIT	660	N660033	4020						0.04	0.18	7914659.69	563216.388	667.943	7.943	WASTE	NAG
2016	PIT	660	N660033	3005						0.01	0.18	7914712.14	563265.735	667.565	7.565	WASTE	NAG
2016	PIT	660	N660033	3017						0.01	0.12	7914672.7	563223.952	667.853	7.853	WASTE	NAG
2016	PIT	660	N660033	2016						0.01	0.17	7914692.43	563240.212	667.996	7.996	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660033	1036						0.005	0.07	7914683	563227.258	667.858	7.858	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660033	2021						0.005	0.03	7914680.73	563227.724	667.923	7.923	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660033	2022						0.02	0.04	7914678.29	563225.117	667.892	7.892	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660033	2026						0.005	0.03	7914668.71	563214.993	667.559	7.559	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660033	2027						0.005	0.01	7914666.43	563212.498	667.583	7.583	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660033	2028						0.01	0.06	7914663.69	563209.538	667.514	7.514	WASTE: GREEN SCH.	NAG

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK

YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	660	N660033	3015						0.01	0.02	7914678.98	563230.356	667.909	7.909	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660033	2012						0.005	0.02	7914702.26	563250.365	667.931	7.931	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660035	1403						0.05	0.01	7914476.87	563124.338	667.064	7.064	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660035	1405						0.04	0.02	7914481.79	563119.99	667.211	7.211	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660035	1406						0.01	0.01	7914485.76	563116.704	667.224	7.224	ORE: HEMATITE	NAG
2016	PIT	660	N660035	1402						0.09	0.01	7914473.1	563127.429	666.977	6.977	ORE: HEMATITE	NAG
2016	PIT	660	N660036	1017						0.01	0.01	7914566.04	563120.391	666.871	6.871	WASTE	NAG
2016	PIT	660	N660036	1022						0.11	0.01	7914556.95	563115.177	667.533	7.533	WASTE	NAG
2016	PIT	660	N660036	3014						0.01	0.01	7914549.73	563115.633	667.418	7.418	WASTE	NAG
2016	PIT	660	N660036	1007						0.18	0.005	7914583.34	563130.266	667.144	7.144	GREEN SCH.	NAG
2016	PIT	660	N660036	1012						0.29	0.005	7914574.69	563125.493	667.139	7.139	GREEN SCH.	NAG
2016	PIT	660	N660036	2003						0.02	0.005	7914586.63	563133.894	667.158	7.158	GREEN SCH.	NAG
2016	PIT	660	N660036	1032						0.05	0.01	7914539.39	563105.052	667.24	7.24	WASTE	NAG
2016	PIT	660	N660036	1027						0.01	0.01	7914548.4	563109.947	667.383	7.383	WASTE	NAG
2016	PIT	660	N660036	1001						0.01	0.005	7914593.41	563135.758	667.396	7.396	GREEN SCH.	NAG
2016	PIT	660	N660036	4008						0.01	0.005	7914565.52	563128.273	667.352	7.352	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	3006						0.07	0.005	7914573.64	563129.254	667.27	7.27	GREEN SCH.	NAG
2016	PIT	660	N660036	4017						0.01	0.01	7914537.75	563112.765	667.305	7.305	WASTE	NAG
2016	PIT	660	N660036	4016						0.12	0.03	7914541.03	563114.525	667.296	7.296	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	4012						0.01	0.04	7914552.93	563121.288	667.661	7.661	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	3003						0.06	0.03	7914583.42	563134.879	667.193	7.193	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660036	4010						0.04	0.005	7914558.92	563124.839	667.348	7.348	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	2016						0.18	0.01	7914555.79	563116.434	667.578	7.578	WASTE	NAG
2016	PIT	660	N660036	4006						0.02	0.005	7914571.41	563131.644	667.505	7.505	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	4002						0.09	0.005	7914584.08	563138.909	667.253	7.253	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660036	5009						0.005	0.04	7914560.26	563128.932	667.519	7.519	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660036	4004						0.03	0.005	7914577.74	563135.168	667.445	7.445	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	3004						0.04	0.005	7914580.5	563133.055	667.083	7.083	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660036	3008						0.06	0.12	7914567.86	563125.829	667.14	7.14	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660036	6002						0.31	0.01	7914578.44	563141.471	667.494	7.494	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660036	5003						0.03	0.005	7914578.11	563139.249	667.512	7.512	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	5013						0.12	0.005	7914547.67	563121.872	667.562	7.562	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	6003						0.05	0.005	7914575.91	563140.629	667.497	7.497	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	5005						0.03	0.005	7914571.34	563135.48	667.494	7.494	ORE: HEMATITE	NAG
2016	PIT	660	N660036	5015						0.08	0.005	7914540.88	563118.101	667.363	7.363	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	5011						0.02	0.005	7914553.73	563125.275	667.737	7.737	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660036	5017						0.01	0.03	7914535.48	563115.143	667.541	7.541	ORE: HEMATITE	NAG
2016	PIT	660	N660036	6004						0.02	0.005	7914572.19	563138.138	667.547	7.547	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660037	1201						0.17	0.01	7914335.03	563030.797	660.078	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660037	1200						0.17	0.01	7914337.15	563031.994	660.581	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660037	1202						0.06	0.01	7914332.05	563029.922	659.866	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660038	1010						0.05	0.005	7914490.49	563107.248	666.989	6.989	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660038	2000						0.07	0.005	7914465.38	563121.953	666.932	6.932	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660038	2001						0.08	0.005	7914465.12	563123.119	667.226	7.226	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1808						0.02	0.01	7914365.63	563036.719	666.112	6.112	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	2006						0.07	0.01	7914361.12	563029.059	663.099	3.099	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2107						0.07	0.01	7914367.09	563027.854	663.669	3.669	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2008						0.06	0.01	7914367.48	563031.329	664.873	4.873	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	2004						0.07	0.01	7914355.15	563026.664	661.211	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2207						0.07	0.01	7914366.85	563024.973	662.788	2.788	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1905						0.02	0.01	7914358.81	563030.867	663.439	3.439	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	2208						0.09	0.01	7914369.45	563026.144	663.131	3.131	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2306						0.13	0.01	7914366	563021.311	661.702	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2106						0.08	0.01	7914364.16	563026.878	662.791	2.791	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1907						0.04	0.01	7914364.73	563033.611	665.615	5.615	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	2007						0.1	0.005	7914364.52	563030.047	664.187	4.187	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	2005						0.16	0.01	7914358.17	563027.851	662.243	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2307						0.09	0.01	7914369.22	563022.857	662.231	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1904						0.05	0.01	7914355.81	563029.77	662.693	2.693	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	1806						0.03	0.01	7914359.39	563033.975	664.574	4.574	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2408						0.03	0.01	7914371.85	563020.627	661.88	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2205						0.1	0.01	7914360.43	563022.293	660.962	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2305						0.05	0.01	7914363.35	563020.26	661.19	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2103						0.05	0.01	7914354.77	563023.272	660.371	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2206						0.05	0.01	7914363.54	563023.703	661.686	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2105						0.06	0.01	7914361.21	563025.564	661.963	2.5	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	2003						0.03	0.01	7914352.1	563025.363	660.628	2.5	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	2406						0.03	0.01	7914366.12	563018.205	661.347	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1807						0.14	0.01	7914362.43	563035.695	665.409	5.409	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1902						0.01	0.07	7914349.75	563027.242	660.922	2.5	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	1705						0.01	0.01	7914356.74	563036.198	664.586	4.586	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	2407						0.05	0.01	7914368.78	563019.546	661.839	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1906						0.15	0.01	7914361.78	563032.203	664.523	4.523	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1802						0.02	0.01	7914346.77	563029.898	661.328	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1903						0.08	0.01	7914352.51	563028.778	661.715	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1805						0.01	0.01	7914356.47	563032.563	663.612	3.612	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	1703						0.03	0.01	7914350.42	563034.122	662.916	2.916	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1901						0.04	0.01	7914346.61	563026.75	660.479	2.5	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	1702						0.01	0.01	7914347.59	563032.92	661.89	2.5	WASTE: GREEN SCH.	NAG
2016	PIT	660	N660039	1804						0.03	0.01	7914353.24	563032.022	662.987	2.987	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1803						0.03	0.01	7914350.18	563030.948	662.026	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1704						0.05	0.01	7914353.88	563035.447	663.827	3.827	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1707						0.05	0.01	7914363.88	563039.538	666.24	6.24	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1801						0.07	0.01	7914344.03	563028.566	660.682	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1701						0.03	0.01	7914344.5	563031.671	661.23	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1700						0.05	0.01	7914341.05	563030.845	660.586	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1605						0.1	0.01	7914353.66	563039.013	664.434	4.434	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1706						0.11	0.01	7914359.69	563037.623	665.221	5.221	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1800						0.12	0.01	7914340.98	563027.406	659.921	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660039	1602						0.1	0.01	7914345.03	563035.195	661.891	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660039	1604						0.03	0.01	7914351.44	563037.318	663.653	3.653	ORE: HEMATITE	NAG
2016	PIT	660	N660039	1400						0.06	0.01	7914337.32	563038.054	661.594	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660039	1606						0.06	0.01	7914357.55	563039.709	665.197	5.197	ORE: HEMATITE	NAG
2016	PIT	660	N660039	1601						0.08	0.01	7914342.14	563033.935	661.245	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660039	1603						0.06	0.01	7914347.73	563036.259	662.502	2.502	ORE: HEMATITE	NAG
2016	PIT	660	N660039	1600						0.17	0.01	7914338.92	563032.718	660.721	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660039	1401						0.02	0.01	7914339.65	563039.079	661.874	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660040	102						0.005	0.005	7914522.39	563095.126	667.045	7.045	GREEN SCH.	NAG
2016	PIT	660	N660040	1302						0.005	0.02	7914527.84	563105.534	667.057	7.057	GREEN SCH.	NAG
2016	PIT	660	N660040	203						0.01	0.02	7914517.78	563095.535	666.782	6.782	GREEN SCH.	NAG
2016	PIT	660	N660040	1304						0.005	0.005	7914519.34	563100.591	667.064	7.064	GREEN SCH.	NAG
2016	PIT	660	N660040	104						0.005	0.04	7914517.61	563092.154	667.026	7.026	GREEN SCH.	NAG
2016	PIT	660	N660040	205						0.005	0.07	7914511.07	563091.45	666.636	6.636	GREEN SCH.	NAG
2016	PIT	660	N660040	106						0.005	0.05	7914512.26	563090.063	666.716	6.716	GREEN SCH.	NAG
2016	PIT	660	N660040	1308						0.005	0.03	7914502.84	563091.001	666.716	6.716	GREEN SCH.	NAG

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK

YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	660	N660040	1306						0.005	0.005	7914510.78	563096.155	666.968	6.968	GREEN SCH.	NAG
2016	PIT	660	N660040	1209						0.005	0.005	7914498.96	563093.953	666.919	6.919	GREEN SCH.	NAG
2016	PIT	660	N660040	1207						0.01	0.005	7914507.59	563098.807	667.044	7.044	GREEN SCH.	NAG
2016	PIT	660	N660040	1203						0.05	0.005	7914524.06	563108.009	667.141	7.141	GREEN SCH.	NAG
2016	PIT	660	N660040	1205						0.07	0.02	7914516.15	563103.983	667.019	7.019	ORE/WASTE	NAG
2016	PIT	660	N660041	202						0.01	0.005	7914496.07	563083.843	666.624	6.624	WASTE	NAG
2016	PIT	660	N660041	102						0.02	0.005	7914502.21	563083.337	666.368	6.368	WASTE	NAG
2016	PIT	660	N660041	302						0.02	0.005	7914490.82	563084.687	666.753	6.753	WASTE	NAG
2016	PIT	660	N660041	205						0.02	0.005	7914486.86	563078.578	666.342	6.342	WASTE	NAG
2016	PIT	660	N660041	1311						0.02	0.005	7914484.18	563085.184	666.899	6.899	WASTE	NAG
2016	PIT	660	N660041	1411						0.01	0.005	7914481.45	563083.193	666.917	6.917	WASTE	NAG
2016	PIT	660	N660041	1211						0.02	0.005	7914486.22	563088.957	667.067	7.067	WASTE	NAG
2016	PIT	660	N660041	300						0.02	0.005	7914499.27	563088.139	666.508	6.508	WASTE	NAG
2016	PIT	660	N660041	1409						0.04	0.005	7914475.49	563087.873	667.43	7.43	ORE/WASTE	NAG
2016	PIT	660	N660041	1111						0.03	0.005	7914488.8	563092.215	667.132	7.132	ORE/WASTE	NAG
2016	PIT	660	N660041	1011						0.04	0.005	7914489.41	563093.626	667.059	7.059	ORE/WASTE	NAG
2016	PIT	660	N660043	300						0.01	0.01	7914480.57	563077.054	666.711	6.711	WASTE	NAG
2016	PIT	660	N660043	1011						0.01	0.01	7914477.35	563080.16	666.699	6.699	WASTE	NAG
2016	PIT	660	N660043	304						0.01	0.01	7914467.09	563071.271	668.144	8.144	WASTE	NAG
2016	PIT	660	N660043	302						0.01	0.01	7914475.04	563076.179	666.883	6.883	WASTE	NAG
2016	PIT	660	N660043	1409						0.05	0.01	7914463.48	563074.107	667.874	7.874	WASTE	NAG
2016	PIT	660	N660043	1210						0.01	0.02	7914469.67	563076.53	668.373	8.373	WASTE	NAG
2016	PIT	660	N660043	202						0.01	0.01	7914478.76	563073.639	666.954	6.954	WASTE	NAG
2016	PIT	660	N660043	100						0.01	0.02	7914485.02	563074.257	666.787	6.787	WASTE	NAG
2016	PIT	660	N660043	1208						0.01	0.005	7914464.49	563082.762	667.409	7.409	ORE/WASTE	NAG
2016	PIT	660	N660043	303						0.01	0.07	7914471.42	563073.321	668.559	8.559	WASTE	NAG
2016	PIT	660	N660043	1408						0.01	0.01	7914459.82	563076.909	667.633	7.633	WASTE	NAG
2016	PIT	660	N660043	1010						0.01	0.005	7914475.24	563083.336	666.878	6.878	WASTE	NAG
2016	PIT	660	N660043	1407						0.02	0.01	7914455.68	563080.149	667.356	7.356	WASTE	NAG
2016	PIT	660	N660043	1009						0.01	0.005	7914472.47	563085.752	667.205	7.205	WASTE	NAG
2016	PIT	660	N660043	105						0.03	0.02	7914473.16	563067.396	668.758	8.758	WASTE	NAG
2016	PIT	660	N660043	1209						0.09	0.005	7914467.62	563080.12	667.631	7.631	WASTE	NAG
2016	PIT	660	N660044	2510						0.01	0.005	7914402.35	563038.069	666.338	6.338	ORE: HEMATITE	NAG
2016	PIT	660	N660044	2309						0.03	0.03	7914397.58	563032.922	665.343	5.343	ORE: HEMATITE	NAG
2016	PIT	660	N660044	1813						0.05	0.02	7914380.62	563039.139	666.272	6.272	WASTE	NAG
2016	PIT	660	N660044	2311						0.02	0.01	7914395.75	563039.063	666.146	6.146	ORE: HEMATITE	NAG
2016	PIT	660	N660044	2112						0.01	0.03	7914388.69	563040.2	666.096	6.096	WASTE	NAG
2016	PIT	660	N660044	1608						0.08	0.01	7914380.66	563021.529	662.811	2.811	WASTE	NAG
2016	PIT	660	N660044	2007						0.16	0.04	7914392.74	563022.566	665.577833	5.57783333	WASTE	NAG
2016	PIT	660	N660044	1807						0.14	0.02	7914387.3	563020.566	665.637333	5.63733333	WASTE	NAG
2016	PIT	660	N660044	1612						0.25	0.1	7914376.26	563033.477	665.545	5.545	WASTE	NAG
2016	PIT	660	N660044	2210						0.03	0.01	7914393.49	563036.714	665.48	5.48	ORE: HEMATITE	NAG
2016	PIT	660	N660044	2009						0.1	0.03	7914390.48	563028.774	664.34	4.34	WASTE	NAG
2016	PIT	660	N660044	1811						0.03	0.06	7914382.54	563032.76	664.85	4.85	WASTE	NAG
2016	PIT	660	N660044	2508						0.02	0.005	7914404.71	563031.799	664.915	4.915	WASTE	NAG
2016	PIT	660	N660044	1413						0.01	0.02	7914369.59	563034.793	666.06	6.06	ORE/WASTE	NAG
2016	PIT	660	N660044	1809						0.11	0.16	7914384.94	563026.524	663.892	3.892	WASTE	NAG
2016	PIT	660	N660044	2110						0.03	0.005	7914391.43	563034.202	665.139	5.139	WASTE	NAG
2016	PIT	660	N660044	1407						0.02	0.02	7914376.41	563016.559	665.518333	5.51833333	WASTE	NAG
2016	PIT	660	N660044	1411						0.02	0.02	7914372.63	563028.729	664.888	4.888	ORE/WASTE	NAG
2016	PIT	660	N660044	2108						0.02	0.005	7914393.36	563027.296	664.461	4.461	ORE: HEMATITE	NAG
2016	PIT	660	N660044	2011						0.11	0.16	7914388.37	563035.008	665.152	5.152	WASTE	NAG
2016	PIT	660	N660044	2013						0.23	0.02	7914385.8	563040.995	666.258	6.258	WASTE	NAG
2016	PIT	660	N660044	1419						0.07	0.01	7914362.74	563053.723	665.458833	5.45883333	ORE/WASTE	NAG
2016	PIT	660	N660044	1610						0.21	0.02	7914378.79	563027.289	664.159	4.159	WASTE	NAG
2016	PIT	660	N660044	2513						0.02	0.005	7914398.99	563047.43	666.995	6.995	WASTE	NAG
2016	PIT	660	N660044	1614						0.01	0.03	7914374.2	563039.821	667.244	7.244	ORE/WASTE	NAG
2016	PIT	660	N660044	2313						0.005	0.005	7914393.46	563045.247	666.888	6.888	WASTE	NAG
2016	PIT	660	N660044	2414						0.03	0.005	7914394.38	563051.067	666.994	6.994	ORE/WASTE	NAG
2016	PIT	660	N660044	2114						0.01	0.01	7914387.07	563046.371	667.375	7.375	WASTE	NAG
2016	PIT	660	N660044	2315						0.14	0.005	7914391.17	563051.411	667.011	7.011	WASTE	NAG
2016	PIT	660	N660044	1815						0.08	0.02	7914378.31	563045.195	667.773	7.773	ORE	NAG
2016	PIT	660	N660045	1506						0.01	0.01	7914438.92	563069.563	667.238	7.238	WASTE	NAG
2016	PIT	660	N660045	1507						0.01	0.01	7914443.46	563066.162	667.406	7.406	WASTE	NAG
2016	PIT	660	N660045	204						0.01	0.01	7914452.67	563058.277	667.751	7.751	WASTE	NAG
2016	PIT	660	N660045	106						0.01	0.02	7914454.77	563057.104	667.944	7.944	WASTE	NAG
2016	PIT	660	N660045	1307						0.04	0.01	7914447.76	563072.074	667.456	7.456	WASTE	NAG
2016	PIT	660	N660045	1505						0.01	0.01	7914435.9	563071.883	667.093	7.093	WASTE	NAG
2016	PIT	660	N660045	102						0.01	0.03	7914464.45	563062.244	668.377	8.377	WASTE	NAG
2016	PIT	660	N660045	1309						0.05	0.01	7914453.63	563067.626	667.499	7.499	WASTE	NAG
2016	PIT	660	N660045	1306						0.02	0.01	7914444.22	563074.981	667.282	7.282	WASTE	NAG
2016	PIT	660	N660045	1508						0.01	0.01	7914446.58	563063.651	667.439	7.439	WASTE	NAG
2016	PIT	660	N660045	202						0.01	0.05	7914460.19	563062.82	668.077	8.077	WASTE	NAG
2016	PIT	660	N660045	1109						0.01	0.02	7914459.07	563068.807	667.708	7.708	ORE/WASTE	NAG
2016	PIT	660	N660045	1308						0.06	0.01	7914450.95	563069.746	667.468	7.468	WASTE	NAG
2016	PIT	660	N660045	1107						0.01	0.02	7914451.36	563076.246	667.362	7.362	ORE/WASTE	NAG
2016	PIT	660	N660045	1108						0.01	0.03	7914455	563072.708	667.58	7.58	ORE/WASTE	NAG
2016	PIT	660	N660045	302						0.23	0.04	7914456.48	563064.487	667.759	7.759	ORE/WASTE	NAG
2016	PIT	660	N660045	101						0.01	0.03	7914467.41	563064.03	668.5	8.5	WASTE	NAG
2016	PIT	660	N660045	304						0.14	0.01	7914449.95	563060.923	667.621	7.621	WASTE	NAG
2016	PIT	660	N660046	1209						0.01	0.02	7914431.31	563061.168	667.239	7.239	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660046	1410						0.01	0.01	7914429.66	563053.298	667.206	7.206	WASTE	NAG
2016	PIT	660	N660046	1409						0.01	0.01	7914427.04	563055.341	666.995	6.995	WASTE	NAG
2016	PIT	660	N660046	101						0.01	0.01	7914437.51	563047.246	667.075	7.075	WASTE	NAG
2016	PIT	660	N660046	1011						0.01	0.01	7914442.78	563059.578	667.105	7.105	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660046	202						0.01	0.01	7914442.45	563052.9	667.346	7.346	WASTE	NAG
2016	PIT	660	N660046	1010						0.01	0.01	7914438.27	563062.829	667.21	7.21	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660046	1012						0.01	0.01	7914446.01	563057.051	667.17	7.17	WASTE	NAG
2016	PIT	660	N660046	1211						0.01	0.01	7914439.28	563054.967	667.318	7.318	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660046	104						0.01	0.01	7914445.94	563051.827	667.494	7.494	WASTE	NAG
2016	PIT	660	N660046	1411						0.01	0.01	7914432.91	563050.706	667.174	7.174	WASTE	NAG
2016	PIT	660	N660046	1210						0.01	0.01	7914436.13	563057.831	667.256	7.256	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660046	200						0.01	0.03	7914435.79	563049.082	667.173	7.173	WASTE	NAG
2016	PIT	660	N660046	1008						0.01	0.01	7914431.79	563068.973	667.05	7.05	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660046	1009						0.01	0.01	7914434.98	563065.461	667.231	7.231	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660046	1408						0.01	0.01	7914422.67	563058.814	667.09	7.09	WASTE	NAG
2016	PIT	660	N660046	1208						0.03	0.01	7914427.47	563064.31	667.273	7.273	WASTE	NAG
2016	PIT	660	N660046	1107						0.01	0.01	7914428.4	563068.54	667.161	7.161	ORE/WASTE	NAG
2016	PIT	660	N660046	1407						0.02	0.02	7914419.38	563061.485	667.096	7.096	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660047	1408						0.005	0.01	7914407.66	563051.34	667.381	7.381	WASTE	NAG
2016	PIT	660	N660047	1011						0.12	0.01	7914421.73	563052.737	666.759	6.759	CHLORITE SCHIST	NAG
2016	PIT	660	N660047	1409						0.005	0.05	7914410.28	563049.232	667.014	7.014	WASTE	NAG
2016	PIT	660	N660047	1410						0.07	0.04	7914411.79	563047.379	666.732	6.732	WASTE	NAG
2016	PIT	660	N660047	1609						0.06	0.03	7914406.51	563044.585	667.204	7.204	WASTE	NAG
2016	PIT	660	N660047	1209						0.05	0.01	7914414.33	563053.483	666.74	6.74	CHLORITE SCHIST	NAG

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	660	N660047	1009						0.24	0.02	7914417.14	563057.083	666.732	6.732	CHLORITE SCHIST	NAG
2016	PIT	660	N660047	1211						0.02	0.02	7914419.24	563049.256	666.717	6.717	WASTE	NAG
2016	PIT	660	N660047	1208						0.08	0.02	7914411.45	563055.881	666.921	6.921	CHLORITE SCHIST	NAG
2016	PIT	660	N660047	1407						0.005	0.005	7914405.34	563053.496	667.729	7.729	WASTE	NAG
2016	PIT	660	N660047	1405						0.19	0.01	7914401.74	563058.171	667.4	7.4	ORE/WASTE	NAG
2016	PIT	660	N660047	1008						0.08	0.01	7914414.46	563059.036	666.95	6.95	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660047	1406						0.09	0.005	7914402.82	563055.418	667.298	7.298	ORE/WASTE	NAG
2016	PIT	660	N660047	1207						0.05	0.02	7914408.89	563057.818	667.256	7.256	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660048	1205						0.02	0.01	7914418.49	563040.672	666.52	6.52	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	201						0.13	0.02	7914429.71	563044.801	666.861	6.861	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	101						0.03	0.07	7914433.27	563044.861	667.014	7.014	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	1202						0.04	0.01	7914427.17	563045.305	666.866	6.866	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	109						0.04	0.07	7914419.31	563036.696	666.115	6.115	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	1103						0.04	0.01	7914421.62	563046.205	666.788	6.788	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	204						0.08	0.01	7914422.67	563040.68	666.737	6.737	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	1105						0.06	0.01	7914416.21	563042.172	666.61	6.61	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	1208						0.06	0.01	7914410.31	563035.682	665.52	5.52	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	105						0.05	0.01	7914426.32	563040.827	666.733	6.733	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	1207						0.03	0.01	7914412.72	563037.376	665.909	5.909	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660048	207						0.11	0.02	7914415.52	563036.662	665.881	5.881	WASTE: SILICIFIED CHLORITE	NAG
2016	PIT	660	N660049	1323						0.04	0.01	7914460.17	563128.96	660.929	2.5	ORE: HEMATITE	NAG
2016	PIT	660	N660049	1544						0.05	0.01	7914507.13	563177.605	661.848	2.5	ORE/WASTE: HEMATITE	NAG
2016	PIT	660	N660051	1510						0.12	0.02	7914938.58	563287.11	666.324	6.324	WASTE	NAG
2016	PIT	660	N660051	2005						0.1	0.01	7914962.01	563264.581	664.279	4.279	WASTE	NAG
2016	PIT	660	N660051	1502						0.01	0.01	7914945.5	563249.537	666.226	6.226	WASTE	NAG
2016	PIT	660	N660051	1808						0.16	0.01	7914951.9	563277.481	665.391	5.391	WASTE	NAG
2016	PIT	660	N660051	1205						0.08	0.11	7914932.66	563259.076	668.252	8.252	WASTE	NAG
2016	PIT	660	N660051	2407						0.01	0.01	7914974.66	563276.529	663.011	3.011	WASTE	NAG
2016	PIT	660	N660051	2109						0.04	0.01	7914961.26	563286.368	664.745	4.745	WASTE	NAG
2016	PIT	660	N660051	1506						0.04	0.01	7914942.05	563268.397	666.148	6.148	WASTE	NAG
2016	PIT	660	N660051	1008						0.04	0.02	7914922.87	563271.828	668.401	8.401	WASTE	NAG
2016	PIT	660	N660051	2411						0.16	0.01	7914970.82	563295.647	664.103	4.103	WASTE	NAG
2016	PIT	660	N660051	2013						0.16	0.05	7914954.47	563302.233	664.459	4.459	WASTE	NAG
2016	PIT	660	N660051	2415						0.24	0.03	7914967.15	563314.734	663.114	3.114	WASTE	NAG
2016	PIT	660	N660052	1008						0.08	0.04	7914941.91	563297.886	665.539	5.539	WASTE: CHLORITE SCHIST	NAG
2016	PIT	660	N660052	1112						0.03	0.01	7914924.45	563284.293	667.926	7.926	WASTE: CHLORITE SCHIST	NAG
2016	PIT	660	N660052	1002						0.04	0.01	7914962.72	563317.11	663.282	3.282	WASTE: CHLORITE SCHIST	NAG
2016	PIT	660	N660053	1805						0.04	0.04	7914908.58	563265.322	666.731	6.731	WASTE	NAG
2016	PIT	660	N660053	1503						0.03	0.005	7914915.93	563275.643	666.79	6.79	WASTE	NAG
2016	PIT	660	N660053	1509						0.03	0.01	7914920.29	563257.788	666.804	6.804	WASTE	NAG
2016	PIT	660	N660053	1402						0.02	0.005	7914917.49	563280.159	666.663	6.663	WASTE	NAG
2016	PIT	660	N660053	1505						0.06	0.005	7914917.55	563269.505	666.413	6.413	WASTE	NAG
2016	PIT	660	N660053	1810						0.03	0.03	7914913.82	563244.158	667.116	7.116	WASTE	NAG
2016	PIT	660	N660053	1507						0.04	0.04	7914918.78	563263.785	666.654	6.654	WASTE	NAG
2016	PIT	660	N660054	2215						0.06	0.01	7914902.15	563247.377	666.897	6.897	GNEISS	NAG
2016	PIT	660	N660054	2209						0.04	0.005	7914897.45	563265.348	666.635	6.635	GNEISS	NAG
2016	PIT	660	N660054	2211						0.04	0.005	7914899.18	563259.544	666.653	6.653	GNEISS	NAG
2016	PIT	660	N660054	2409						0.12	0.04	7914891.97	563263.807	666.449	6.449	GNEISS	NAG
2016	PIT	660	N660055	1803						0.01	0.01	7914903.56	563286.085	666.792	6.792	WASTE	NAG
2016	PIT	660	N660055	1203						0.01	0.01	7914918.7	563289.949	667.789	7.789	WASTE	NAG
2016	PIT	660	N660055	2505						0.09	0.01	7914887.08	563274.271	666.397	6.397	WASTE	NAG
2016	PIT	660	N660055	2103						0.03	0.01	7914895.84	563282.341	666.807	6.807	WASTE	NAG
2016	PIT	667	N667046	1606						0.005	0.005	7914804.96	563219.892	677.943	10.943	WASTE	NAG
2016	PIT	667	N667046	1807						0.005	0.005	7914807.41	563211.538	677.792	10.792	WASTE	NAG
2016	PIT	667	N667046	1603						0.005	0.005	7914790.94	563223.973	679.026	12.026	WASTE	NAG
2016	PIT	667	N667046	1207						0.005	0.005	7914813.74	563233.171	677.495	10.495	WASTE	NAG
2016	PIT	667	N667046	1408						0.01	0.005	7914816.19	563224.113	677.075	10.075	WASTE	NAG
2016	PIT	667	N667046	1204						0.005	0.005	7914800.37	563236.787	678.126	11.126	WASTE	NAG
2016	PIT	667	N667046	1804						0.005	0.005	7914793.63	563215.266	678.368	11.368	WASTE	NAG
2016	PIT	667	N667046	1801						0.03	0.03	7914780	563218.776	679.123	12.123	WASTE	NAG
2016	PIT	667	N667047	1812						0.005	0.005	7914754.95	563219.058	675.005	8.005	WASTE	NAG
2016	PIT	667	N667047	2009						0.01	0.06	7914739.5	563223.488	674.556	7.556	WASTE	NAG
2016	PIT	667	N667047	2109						0.04	0.01	7914738.26	563218.887	674.755	7.755	WASTE	NAG
2016	PIT	667	N667047	2308						0.02	0.02	7914729.6	563217.201	674.762	7.762	WASTE	NAG
2016	PIT	667	N667047	2306						0.005	0.02	7914723.02	563223.479	674.925	7.925	WASTE	NAG
2016	PIT	667	N667047	1913						0.05	0.01	7914757.41	563211.493	674.744	7.744	WASTE	NAG
2016	PIT	667	N667047	2113						0.03	0.05	7914752.32	563205.989	674.784	7.784	WASTE	NAG
2016	PIT	667	N667047	2313						0.03	0.02	7914745.97	563201.963	674.637	7.637	WASTE	NAG
2016	PIT	667	N667047	1910						0.01	0.07	7914747.16	563221.536	674.742	7.742	WASTE	NAG
2016	PIT	667	N667047	2206						0.01	0.15	7914723.31	563227.334	674.861	7.861	WASTE	NAG
2016	PIT	667	N667048	2304						0.01	0.01	7914760.08	563198.183	679.093	12.093	WASTE	NAG
2016	PIT	667	N667048	2308						0.005	0.01	7914773.69	563210.022	679.737	12.737	WASTE	NAG
2016	PIT	667	N667048	2406						0.02	0.01	7914767.8	563199.661	678.959	11.959	WASTE	NAG
2016	PIT	667	N667048	2507						0.005	0.07	7914775.77	563201.263	678.694	11.694	WASTE	NAG
2016	PIT	667	N667048	2913						0.21	0.03	7914804.53	563206.13	677.935	10.935	WASTE	NAG
2016	PIT	667	N667048	2207						0.01	0.05	7914765.97	563208.307	679.162	12.162	WASTE	NAG
2016	PIT	667	N667048	2613						0.05	0.005	7914794.65	563209.224	678.504	11.504	WASTE	NAG
2016	PIT	667	N667048	2910						0.01	0.05	7914795.54	563198.532	678.03	11.03	WASTE	NAG
2016	PIT	667	N667048	2802						0.02	0.02	7914764.55	563176.64	677.166	10.166	WASTE	NAG
2016	PIT	667	N667048	2604						0.01	0.005	7914766.17	563187.885	677.579	10.579	WASTE	NAG
2016	PIT	667	N667048	2908						0.01	0.005	7914788.1	563193.261	678.166	11.166	WASTE	NAG
2016	PIT	667	N667048	2710						0.01	0.02	7914790.13	563204.308	678.253	11.253	WASTE	NAG
2016	PIT	667	N667048	2609						0.005	0.06	7914782.73	563202.634	678.353	11.353	WASTE	NAG
2016	PIT	667	N667048	2410						0.05	0.04	7914781.02	563210.782	678.72	11.72	WASTE	NAG
2016	PIT	667	N667048	2402						0.01	0.01	7914754.52	563188.18	678.113	11.113	WASTE	NAG
2016	PIT	667	N667048	2905						0.02	0.005	7914778.66	563183.963	677.462	10.462	WASTE	NAG
2016	PIT	667	N667048	2101						0.02	0.005	7914747.41	563192.147	678.431	11.431	WASTE	NAG
2016	PIT	667	N667048	2706						0.01	0.005	7914776.77	563192.482	677.995	10.995	WASTE	NAG
2016	PIT	667	N667049	1525						0.005	0.02	7914861.1	563236.932	674.021	7.021	WASTE	NAG
2016	PIT	667	N667049	1325						0.005	0.02	7914856.3	563242.584	674.247	7.247	WASTE	NAG
2016	PIT	667	N667049	1522						0.08	0.05	7914851.57	563228.393	674.439	7.439	WASTE	NAG
2016	PIT	667	N667049	1430						0.04	0.02	7914873.66	563252.743	672.698	5.698	WASTE	NAG
2016	PIT	667	N667049	1328						0.01	0.05	7914866.49	563251.353	673.548	6.548	WASTE	NAG
2016	PIT	667	N667049	1424						0.005	0.02	7914853.86	563235.405	674.635	7.635	WASTE	NAG
2016	PIT	667	N667049	1322						0.13	0.03	7914846.56	563233.86	674.97	7.97	WASTE	NAG
2016	PIT	667	N667049	1427						0.005	0.02	7914863.72	563244.042	673.798	6.798	WASTE	NAG
2016	PIT	667	N667049	1528						0.11	0.02	7914871.26	563245.746	672.991	5.991	WASTE	NAG
2016	PIT	667	N667049	1314						0.04	0.02	7914820.25	563210.487	676.565	9.565	WASTE	NAG
2016	PIT	667	N667049	1318						0.12	0.03	7914833.4	563221.967	675.673	8.673	WASTE	NAG
2016	PIT	667	N667049	1412						0.01	0.02	7914814.33	563200.196	676.904	9.904	WASTE	NAG
2016	PIT	667	N667049	1416						0.005	0.05	7914827.36	563211.855	675.93	8.93	WASTE	NAG
2016	PIT	667	N667049	1420						0.17	0.03	7914840.5	563223.542	674.984	7.984	WASTE	NAG
2016	PIT	667	N667049	1514						0.005	0.02	7914825.16	563204.708	675.955	8.955	WASTE	NAG
2016	PIT	667	N667049	1518						0.09	0.02	7914838.35	563216.608	675.238	8.238	WASTE	NAG
2016	PIT	667	N667049	1306						0.14	0.03	7914793.61	563187.038	677.579	10.579	WASTE	NAG

Baffinland

TABLE D.5.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 NPAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	667	N667049	1310						0.06	0.03	7914806.95	563198.899	677.132	10.132	WASTE	NAG
2016	PIT	667	N667049	1408						0.03	0.03	7914801.11	563188.591	677.188	10.188	WASTE	NAG
2016	PIT	667	N667049	1506						0.09	0.03	7914798.79	563181.33	676.877	9.877	WASTE	NAG
2016	PIT	667	N667049	1510						0.01	0.04	7914811.98	563193.161	676.528	9.528	WASTE	NAG
2016	PIT	667	N667049	1302						0.03	0.005	7914780.89	563175.556	676.955	9.955	WASTE	NAG
2016	PIT	667	N667049	1404						0.06	0.005	7914787.98	563176.845	676.818	9.818	WASTE	NAG
2016	PIT	667	N667049	1502						0.04	0.005	7914785.59	563169.691	676.074	9.074	WASTE	NAG
2016	PIT	667	N667050	1508						0.03	0.005	7914891.06	563262.837	670.863	3.863	WASTE	NAG
2016	PIT	667	N667050	1105						0.03	0.005	7914874.18	563273.129	672.246	5.246	WASTE	NAG
2016	PIT	667	N667050	1407						0.02	0.005	7914885.8	563268.776	670.956	3.956	WASTE	NAG
2016	PIT	667	N667050	1109						0.01	0.005	7914876.78	563255.708	672.183	5.183	WASTE	NAG
2016	PIT	667	N667050	1504						0.005	0.005	7914887.76	563280.297	670.947	3.947	WASTE	NAG
2016	PIT	667	N667050	1403						0.01	0.005	7914882.4	563286.244	671.546	4.546	WASTE	NAG
2016	PIT	667	N667050	1305						0.04	0.01	7914880.9	563274.511	671.453	4.453	WASTE	NAG
2016	PIT	667	N667050	1208						0.005	0.005	7914879.04	563263.148	671.846	4.846	WASTE	NAG
2016	PIT	667	N667050	1309						0.005	0.005	7914884.63	563257.448	671.414	4.414	WASTE	NAG
2016	PIT	667	N667050	1204						0.01	0.01	7914875.9	563280.088	672.03	5.03	WASTE	NAG
2016	PIT	667	N667051A	11024						0.02	0.005	7914839.1	563206.458	674.675	7.675	WASTE	NAG
2016	PIT	667	N667051A	11036						0.05	0.005	7914799.17	563171.691	676.33	9.33	WASTE	NAG
2016	PIT	667	N667051A	11030						0.04	0.005	7914819	563189.243	675.978	8.978	WASTE	NAG
2016	PIT	667	N667051A	11012						0.02	0.01	7914878.35	563241.718	672.141	5.141	WASTE	NAG
2016	PIT	667	N667051A	11018						0.02	0.005	7914858.62	563224.107	673.877	6.877	WASTE	NAG
2016	PIT	667	N667051A	10015						0.01	0.01	7914868.44	563236.789	673.251	6.251	WASTE	NAG
2016	PIT	667	N667051A	10028						0.02	0.02	7914825.87	563197.49	675.604	8.604	WASTE	NAG
2016	PIT	667	N667051A	10021						0.09	0.01	7914848.72	563218.654	674.425	7.425	WASTE	NAG
2016	PIT	667	N667051B	14018						0.2	0.005	7914860.88	563211.278	673.666	6.666	WASTE	NAG
2016	PIT	667	N667051B	14013						0.04	0.005	7914877.68	563225.528	672.376	5.376	WASTE	NAG
2016	PIT	667	N667051B	13025						0.07	0.01	7914838.4	563193.616	675.179	8.179	WASTE	NAG
2016	PIT	667	N667051B	17028						0.01	0.005	7914831	563168.9	666.5	0.5	WASTE	NAG
2016	PIT	667	N667051B	15027						0.43	0.03	7914832.33	563180.393	673.847	6.847	WASTE	NAG
2016	PIT	667	N667051B	15033						0.07	0.02	7914812.44	563163.023	674.518	7.518	WASTE	NAG
2016	PIT	667	N667051B	14031						0.27	0.01	7914817.94	563173.227	674.671	7.671	WASTE	NAG
2016	PIT	667	N667051B	15015						0.15	0.005	7914871.67	563215.839	672.985	5.985	WASTE	NAG
2016	PIT	667	N667051B	17016						0.005	0.03	7914870.1	563203.76	672.516	5.516	WASTE	NAG
2016	PIT	667	N667051B	17022						0.04	0.005	7914850.28	563186.36	673.149	6.149	WASTE	NAG
2016	PIT	667	N667051B	13013						0.29	0.005	7914878.16	563228.062	672.255	5.255	GNEISS/WASTE	NAG
2016	PIT	667	N667051B	15021						0.06	0.01	7914851.87	563198.534	673.872	6.872	WASTE	NAG
2016	PIT	667	N667051B	14025						0.09	0.02	7914838.48	563189.977	674.805	7.805	WASTE	NAG
2016	PIT	667	N667051C	11006						0.09	0.01	7914898.13	563259.085	670.233	3.233	WASTE	NAG
2016	PIT	667	N667051C	9004						0.01	0.01	7914902.66	563273.824	669.745	2.745	WASTE	NAG
2016	PIT	667	N667051C	7006						0.08	0.01	7914894.48	563276.607	670.426	3.426	WASTE	NAG
2016	PIT	667	N667051C	13007						0.07	0.01	7914896.62	563247.681	670.427	3.427	WASTE	NAG
2016	PIT	667	N667051C	17010						0.17	0.01	7914890	563221.4	666.5	0.5	WASTE	NAG
2016	PIT	667	N667051C	15009						0.35	0.01	7914889.97	563232.763	671.313	4.313	WASTE	NAG
2016	PIT	667	N667051C	15003						0.27	0.01	7914911.37	563250.512	669.471	2.5	WASTE	NAG
2016	PIT	667	N667051C	11000						0.14	0.01	7914917.62	563276.682	668.574	2.5	WASTE	NAG
2016	PIT	667	N667051C	13001						0.15	0.02	7914916.32	563264.964	668.885	2.5	WASTE	NAG
2016	PIT	667	N667051C	7000						0.05	0.01	7914914.24	563294.206	668.968	2.5	WASTE	NAG
2016	PIT	667	N667051C	17004						0.12	0.01	7914909.61	563238.893	669.831	2.831	WASTE	NAG
2016	PIT	667	N667051C	1003						0.12	0.04	7914899.43	563311.083	669.93	2.93	WASTE	NAG
2016	PIT	667	N667051C	5003						0.03	0.01	7914902.79	563293.753	670.207	3.207	WASTE	NAG
2016	PIT	667	N667051C	3005						0.06	0.01	7914894.52	563296.942	670.92	3.92	WASTE	NAG
2016	PIT	667	N667051C	3001						0.08	0.01	7914907.44	563308.509	668.778	2.5	WASTE	NAG

TABLE D.5.3
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 PAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK

YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	630	N630001	2621	1	24	7.5	17	3.2	0.11	0.24	7914987.51	563520.17	637.094	7.094	WASTE	PAG
2016	PIT	630	N630002	2019	1	17	9.7	7	1.75	0.005	0.31	7914995.15	563499.314	636.706	6.706	CHLORITE SCHIST	PAG
2016	PIT	630	N630004	1207	1	-6	38.1	-44	-0.16	0.01	1.22	7914713.13	563416.836	640.715	10.715	ORE:WASTE	PAG
2016	PIT	630	N630004	1204	1	-1	14.1	-15	-0.07	0.01	0.45	7914721.39	563422.952	641.153	11.153	Mag/Waste	PAG
2016	PIT	630	N630004	1203	1	-2	11.9	-14	-0.17	0.01	0.38	7914723.92	563425	641.102	11.102	ORE:MAGNETITE	PAG
2016	PIT	630	N630004	1205	1	2	10.3	-8	0.19	0.01	0.33	7914718.96	563420.739	640.995	10.995	Mag/Waste	PAG
2016	PIT	630	N630004	1206						0.01	0.32	7914716.26	563418.636	641.121	11.121	ORE:WASTE	PAG
2016	PIT	630	N630006	1349	1	7	8.1	-1	0.86	0.15	0.26	7914594.89	563332.814	635.846	5.846	WASTE: TILL PAG	PAG
2016	PIT	630	N630007	1314						0.01	0.33	7914637.56	563349.126	640.54	10.54	ORE/WASTE: MAGNETITE/CHLORITE SCHIST	PAG
2016	PIT	630	N630008	1202	1	5	16.6	-12	0.3	0.03	0.53	7914620.74	563344.657	640.565	10.565	ORE/WASTE: HEMATITE/CHLORITE SCHIST	PAG
2016	PIT	630	N630008	1103	1	6	21.3	-15	0.28	0.02	0.68	7914626.21	563343.536	640.687	10.687	WASTE: CHLORITE SCHIST	PAG
2016	PIT	630	N630008	1304	1	6	7.5	-2	0.8	0.01	0.24	7914624.56	563335.55	640.41	10.41	ORE/WASTE: MAGNETITE/CHLORITE SCHIST	PAG
2016	PIT	630	N630009	1209	1	8	10.9	-3	0.73	0.01	0.35	7914644.04	563318.764	640.632	10.632	WASTE: CHLORITE SCHIST	PAG
2016	PIT	630	N630009	1306	1	3	213.8	-211	0.01	0.04	6.84	7914655.1	563325.325	640.319	10.319	ORE:WASTE	PAG
2016	PIT	630	N630009	1307	1	2	69.1	-67	0.03	0.01	2.21	7914651.04	563321.693	640.286	10.286	ORE:WASTE	PAG
2016	PIT	630	N630009	1211	1	0	90.9	-91	0	0.02	2.91	7914637.35	563312.432	640.271	10.271	ORE:WASTE	PAG
2016	PIT	630	N630009	1301	1	0	101.3	-101	0	0.01	3.24	7914670.37	563341.348	640.221	10.221	ORE/WASTE: MAGNETITE/CHLORITE SCHIST	PAG
2016	PIT	630	N630009	1303	1	-7	44.7	-52	-0.16	0.01	1.43	7914664.76	563336.011	639.663	9.663	ORE/WASTE: MAGNETITE/CHLORITE SCHIST	PAG
2016	PIT	630	N630009	1207	1	-2	44.4	-46	-0.05	0.05	1.42	7914650.25	563325.591	640.207	10.207	WASTE: CHLORITE SCHIST	PAG
2016	PIT	640	N640001	1512	1	14	15.6	-2	0.9	0.22	0.5	7914958.84	563489.749	646.154	6.154	ORE: MAGNETITE	PAG
2016	PIT	640	N640005	1015	1	7	12.2	-5	0.57	0.01	0.39	7914849.59	563497.614	646.601	6.601	ORE/WASTE: SPECULARITE	PAG
2016	PIT	640	N640009	1612	1	4	32.2	-28	0.12	0.04	1.03	7914864.7	563437.456	650.199	10.199	WASTE	PAG
2016	PIT	640	N640009	1602	1	10	14.7	-5	0.68	0.03	0.47	7914841.89	563478.406	650.123	10.123	CHLORITE SCHIST	PAG
2016	PIT	640	N640009	1603	1	11	31.9	-21	0.35	0.04	1.02	7914843.92	563474.787	650.074	10.074	CHLORITE SCHIST	PAG
2016	PIT	640	N640009	1604	1	7	61.6	-55	0.11	0.005	1.97	7914846.19	563470.495	650.251	10.251	CHLORITE SCHIST/MAGNETITE	PAG
2016	PIT	640	N640010	1612	1	10	8.4	2	1.19	0.01	0.27	7914838.88	563429.113	649.735	9.735	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1210	1	12	10.3	2	1.16	0.01	0.33	7914847.59	563444.678	650.001	10.001	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1411	1	6	11.3	-5	0.53	0.01	0.36	7914843.34	563436.886	649.797	9.797	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1610	1	13	18.8	-6	0.69	0.01	0.6	7914834.18	563437.345	649.856	9.856	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1611	1	10	10.3	0	0.97	0.01	0.33	7914836.62	563433.291	649.841	9.841	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1209	1	17	30.3	-13	0.56	0.04	0.97	7914845.24	563448.943	650.091	10.091	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1008	1	12	12.5	-1	0.96	0.03	0.4	7914848.44	563455.44	650.422	10.422	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1409	1	9	11.9	-3	0.76	0.01	0.38	7914838.62	563445.291	649.788	9.788	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1613						0.01	0.48	7914841.33	563425.53	649.752	9.752	ORE: MAGNETITE	PAG
2016	PIT	640	N640010	1410	1	5	25.9	-21	0.19	0.01	0.83	7914841.28	563441.132	649.906	9.906	WASTE: GREEN SCHIST	PAG
2016	PIT	640	N640010	1202	1	1	7.2	-6	0.14	0.01	0.23	7914829.25	563477.716	649.83	9.83	ORE/WASTE: SPECULARITE/BIF	PAG
2016	PIT	640	N640010	1402	1	1	15.9	-15	0.06	0.01	0.51	7914822.7	563473.984	649.837	9.837	ORE/WASTE: SPECULARITE/BIF	PAG
2016	PIT	640	N640011	1114	1	15	10.6	4	1.41	0.01	0.34	7914835.75	563418.857	650.166	10.166	CHLORITE SCHIST	PAG
2016	PIT	640	N640011	1013	1	14	11.6	2	1.21	0.02	0.37	7914835.75	563427.333	650.073	10.073	CHLORITE SCHIST	PAG
2016	PIT	640	N640011	1112	1	19	10	9	1.9	0.04	0.32	7914831.27	563427.297	650.053	10.053	CHLORITE SCHIST	PAG
2016	PIT	640	N640011	1014	1	14	16.6	-3	0.85	0.02	0.53	7914837.42	563423.538	649.941	9.941	CHLORITE SCHIST	PAG
2016	PIT	640	N640011	1216	1	14	11.6	2	1.21	0.005	0.37	7914834.54	563413.269	650.41	10.41	CHLORITE SCHIST	PAG
2016	PIT	640	N640011	1213	1	15	21.6	-7	0.7	0.005	0.69	7914828.94	563423.598	650.138	10.138	CHLORITE SCHIST	PAG
2016	PIT	640	N640011	1015	1	3	7.8	-5	0.38	0.005	0.25	7914839.55	563419.974	649.954	9.954	ORE: MAGNETITE	PAG
2016	PIT	640	N640017	1207						0.04	0.35	7914744.64	563390.328	650.21	10.21	ORE	PAG
2016	PIT	640	N640019	1413	1	9	7.8	1	1.15	0.005	0.25	7914743.45	563348.938	650.087	10.087	WASTE	PAG
2016	PIT	640	N640019	1004	1	9	35.3	-26	0.25	0.02	1.13	7914727.38	563384.488	649.849	9.849	ORE/WASTE	PAG
2016	PIT	640	N640022	1002	1	11	8.1	3	1.35	0.01	0.26	7914817.73	563399.325	650.354	10.354	CHLORITE SCHIST	PAG
2016	PIT	640	N640022	1211	1	7	7.8	-1	0.9	0.02	0.25	7914781.57	563373.735	650.245	10.245	ORE/WASTE	PAG
2016	PIT	640	N640022	1004	1	6	11.9	-6	0.51	0.01	0.38	7914810.24	563393.189	650.358	10.358	ORE/WASTE	PAG
2016	PIT	640	N640022	1207	1	4	8.4	-4	0.47	0.01	0.27	7914794.84	563387.817	650.443	10.443	ORE/WASTE	PAG
2016	PIT	640	N640022	1003	1	5	9.7	-5	0.52	0.01	0.31	7914813.63	563396.695	650.07	10.07	ORE/WASTE	PAG
2016	PIT	640	N640022	1208	1	2	6.6	-5	0.3	0.12	0.21	7914791.9	563384.686	650.663	10.663	ORE/WASTE	PAG
2016	PIT	640	N640025	1001	1	8	13.8	-6	0.58	0.01	0.44	7914852.49	563413.59	650.067	10.067	WASTE	PAG
2016	PIT	640	N640030	1407	1	6	7.8	-2	0.77	0.01	0.25	7914648.1	563309.157	649.977	9.977	CHLORITE SCHIST	PAG
2016	PIT	640	N640030	1206	1	5	71.6	-67	0.07	0.01	2.29	7914649.79	563318.226	649.929	9.929	CHLORITE SCHIST	PAG
2016	PIT	640	N640030	1106	1	2	50.3	-48	0.04	0.01	1.61	7914654.34	563318.925	650.092	10.092	ORE: HEMATITE/MAGNETITE	PAG
2016	PIT	640	N640031	1207	1	14	10.3	4	1.36	0.19	0.33	7914640.57	563293.959	649.843	9.843	WASTE: CHLORITE SCHIST	PAG
2016	PIT	640	N640031	1004						0.01	0.62	7914635.63	563309.621	649.878	9.878	ORE:MAGNETITE	PAG
2016	PIT	640	N640034	1208	1	11	45.3	-34	0.24	0.005	1.45	7914612.01	563288.416	649.916	9.916	WASTE: CHLORITE SCHIST	PAG
2016	PIT	640	N640034	1013						0.005	0.22	7914633.8	563276.395	650.259	10.259	ORE:WASTE	PAG
2016	PIT	640	N640038	1506						0.17	0.4	7914573.2	563244.673	649.845	9.845	ORE:LIMONITE/HEMATITE	PAG
2016	PIT	640	N640039	1405	1	6	87.5	-82	0.07	0.005	2.8	7914555.92	563232.95	650.108	10.108	WASTE: CHLORITE SCHIST	PAG
2016	PIT	640	N640039	1206	1	2	11.3	-9	0.18	0.22	0.36	7914561.29	563238.594	650.006	10.006	ORE:WASTE	PAG
2016	PIT	640	N640039	1106	1	1	9.1	-8	0.11	0.47	0.29	7914565.69	563239.841	649.764	9.764	ORE:WASTE	PAG
2016	PIT	640	N640040	1105	1	2	20.9	-19	0.1	0.6	0.67	7914547.3	563224.129	649.853	9.853	ORE:HEMATITE/MAG	PAG
2016	PIT	650	N650004	1706	1	13	35.9	-23	0.36	0.01	1.15	7914847.26	563450.505	660.27	10.27	GREEN SCH.	PAG
2016	PIT	650	N650004	1501	1	9	12.5	-4	0.72	0.005	0.4	7914845.72	563469.156	659.62	9.62	GREEN SCH.	PAG
2016	PIT	650	N650004	1502	1	9	12.8	-4	0.7	0.005	0.41	7914846.78	563467.323	659.642	9.642	ORE/WASTE/GREEN SCH	PAG
2016	PIT	650	N650004	1604						0.005	2.25	7914846.7	563458.954	659.962	9.962	ORE: SPECULARITE	PAG
2016	PIT	650	N650004	1605						0.005	1.17	7914847.43	563457.759	660.003	10.003	ORE: SPECULARITE	PAG
2016	PIT	650	N650004	1603						0.005	0.36	7914844.3	563463.16	659.948	9.948	ORE: SPECULARITE	PAG
2016	PIT	650	N650005	1010						0.04	0.66	7914848.34	563438.098	659.913	9.913	GREEN SCH.	PAG
2016	PIT	650	N650005	1009						0.03	0.29	7914847.08	563440.842	659.94	9.94	GREEN SCH.	PAG
2016	PIT	650	N650005	1416	1	7	18.8	-12	0.37	0.05	0.6	7914851.37	563407.599	659.988	9.988	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650005	1209	1	11	24.4	-13	0.45	0.01	0.78	7914841.13	563439.617	659.925	9.925	GREEN SCH.	PAG
2016	PIT	650	N650005	1308	1	14	8.4	6	1.66	0.06	0.27	7914836.63	563439.763	659.949	9.949	GREEN SCH.	PAG
2016	PIT	650	N650005	1110	1	10	7.8	2	1.28	0.01	0.25	7914848.01	563435.388	659.973	9.973	GREEN SCH.	PAG
2016	PIT	650	N650005	1109	1	14	22.2	-8	0.63	0.03	0.71	7914845.55	563439.447	659.915	9.915	GREEN SCH.	PAG
2016	PIT	650	N650005	1405	1	3	9.4	-6	0.32	0.01	0.3	7914826.34	563449.767	660.026	10.026	ORE/WASTE: HEMATITE	PAG
2016	PIT	650	N650005	1008						0.01	11.5	7914844.8	563447.417	659.82	9.82	GREEN SCH.	PAG
2016	PIT	650	N650005	1315	1	11	7.2	4	1.53	0.01	0.23	7914854.05	563411.073	660.017	10.017	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1012	1	14	15.6	-2	0.9	0.02	0.5	7914838.26	563420.573	660.379	10.379	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1112	1	12	13.1	-1	0.91	0.01	0.42	7914836.82	563417.767	660.29	10.29	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1415	1	13	12.5	1	1.04	0.005	0.4	7914834.03	563401.193	660.139	10.139	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1213	1	14	9.7	4	1.45	0.01	0.31	7914835.55	563413.19	660.387	10.387	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1010	1	12	9.4	3	1.28	0.04	0.3	7914833.48	563427.786	660.32	10.32	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1215	1	11	10.6	0	1.04	0.01	0.34	7914839.99	563405.262	659.925	9.925	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1116	1	7	46.6	-40	0.15	0.02	1.49	7914846.21	563401.678	659.923	9.923	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1314	1	13	46.9	-34	0.28	0.01	1.5	7914835.52	563405.591	660.161	10.161	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1214	1	16	31.9	-16	0.5	0.02	1.02	7914837.59	563409.739	660.182	10.182	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650006	1216	1	6	12.8	-7	0.47	0.01	0.41	7914842.75	563400.861	659.884	9.884	ORE/WASTE: HEMATITE	PAG
2016	PIT	650	N650006	1014	1	11	8.4	3	1.3	0.01	0.27	7914842.98	563412.481	660.115	10.115	ORE/WASTE: SPECULARITE	PAG
2016	PIT	650	N650006	1113	1	4	19.7	-16	0.2	0.01	0.63	7914839.64	563413.3	660.158	10.158	ORE/WASTE: SPECULARITE	PAG
2016	PIT	650	N650006	1114	1	7	20.3	-13	0.34	0.01	0.65	7914841.99	563409.419	660.04	10.04	ORE/WASTE: SPECULARITE	PAG
2016	PIT	650	N650006	1104	1	4	7.2	-3	0.56	0.01	0.23	7914819.48	563446.289	659.615	9.615	ORE/WASTE: SPECULARITE	PAG
2016	PIT	650	N650008	1102	1	1	8.8	-8	0.11	0.04	0.28	7914822.29	563469.429	652.107	2.5	ORE/WASTE: HEMATITE	PAG
2016	PIT	650	N650009	1016	1	3	25.9	-23	0.12	0.02	0.83	7914830.73	563394.053	659.974	9.974	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650009	5013	1	2	13.1	-11	0.15	0.005	0.42	7914812.62	563400.465	660.426	10.426	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650009	5014	1	2	10.9	-9	0.18	0.02	0.35	7914814.92	563396.026	660.199	10.199	WASTE: GREEN SCH.	PAG
2016	PIT	650	N650009	4014	1	3	8.8	-6	0.34	0.04	0.28	7914819.49	563395.401	660.328	10.328	ORE/WASTE: HEMATITE	PAG
2016	PIT	650	N650009	5012	1	-1	18.8	-20	-0.05	0.005	0.6	7914810.3	563404.061	660.348	10.348	ORE/WASTE: HEMATITE	PAG
2016	PIT	650	N650009	4015	1	1	16.6	-16	0.06	0.005	0.53	7914822.42	563391.452	660.416	10.416	ORE/WASTE: HEMATITE	PAG
2016	PIT	650	N650009	3013						0.005	0.24	7914818.87	563403.799	660.036	10.036	ORE: HEMATITE	PAG
2016	PIT	650	N650010	6014	1	5	19.4	-14	0.26	0.04	0.62	7914811.37	563390.409	659.968	9.968	GREEN SCH.	PAG
2016	PIT	650	N650010	1414	1	3	7.2	-4	0.42	0.07	0.23	7914793.11	563382.706	660.053	10.053	ORE/WASTE/BIF	PAG
2016	PIT	650	N650010	1113	1	1	8.4	-7	0.12	0.005	0.27	7914801.09	563390.466	659.761	9.761	ORE: HEMATITE	PAG
2016	PIT	650	N650010	1313	1	0	10	-10	0	0.22	0.32	7914794.87	563386.648	659.999	9.999	ORE: HEMATITE	PAG
2016	PIT	650	N650018	1414	1	-2	118.1	-120	-0.02	0.01	3.78	7914658.63	563322.517	660.178	10.178	WASTE	PAG
2016	PIT	650	N650018	1614	1	5	122.5	-118	0.04	0.005	3.92	7914654.07	563316.84	660.503	10.503	WASTE	PAG

TABLE D.5.3
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 PAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	650	N650018	1014	1	-3	31.9	-35	-0.09	0.02	1.02	7914669.64	563330.554	659.764	9.764	ORE: MAGNETITE/LIMONITE	PAG
2016	PIT	650	N650018	1214	1	1	20.3	-19	0.05	0.02	0.65	7914664.21	563327.772	660.419	10.419	ORE: MAGNETITE/LIMONITE	PAG
2016	PIT	650	N650020	1005	1	12	11.9	0	1.01	0.01	0.38	7914646.42	563316.156	660.086	10.086	CHLORITE SCHIST	PAG
2016	PIT	650	N650020	1006	1	13	20.3	-7	0.64	0.01	0.65	7914648.71	563314.655	660.0575	10.0575	CHLORITE SCHIST	PAG
2016	PIT	650	N650020	1207	1	7	8.8	-2	0.8	0.005	0.28	7914648.31	563305.961	659.934	9.934	GREEN SCH.	PAG
2016	PIT	650	N650020	1205	1	-6	58.4	-64	-0.1	0.005	1.87	7914642.71	563310.814	660.12	10.12	CHLORITE SCHIST	PAG
2016	PIT	650	N650020	1004						0.01	0.9	7914644.81	563319.204	660.037	10.037	ORE: MAGNETITE	PAG
2016	PIT	650	N650022	1507	1	2	13.4	-11	0.15	0.005	0.43	7914899.14	563408.571	660.819	10.819	CHLORITE SCHIST	PAG
2016	PIT	650	N650022	1405	1	1	37.5	-37	0.03	0.005	1.2	7914907.69	563419.442	660.52	10.52	WASTE	PAG
2016	PIT	650	N650022	213	1	1	243.1	-242	0	0.005	7.78	7914891.4	563400.209	660.853	10.853	ORE/WASTE	PAG
2016	PIT	650	N650022	119	1	0	186.6	-187	0	0.005	5.97	7914889.74	563396.129	660.544	10.544	ORE/WASTE	PAG
2016	PIT	650	N650022	1303	1	8	42.5	-35	0.19	0.005	1.36	7914914.47	563424.51	659.979	9.979	ORE/WASTE: MAGNETITE/CHLORITE	PAG
2016	PIT	650	N650022	117						0.01	1.02	7914894.39	563398.563	660.944	10.944	ORE/WASTE	PAG
2016	PIT	650	N650025	1011	1	13	105.3	-92	0.12	0.01	3.37	7914598	563263.961	660.236	10.236	ORE/WASTE	PAG
2016	PIT	650	N650027	111	1	9	11.9	-3	0.76	0.005	0.38	7914839.85	563373.225	660.243	10.243	CHLORITE SCHIST	PAG
2016	PIT	650	N650027	202	1	7	72.8	-66	0.1	0.01	2.33	7914857.51	563383.263	660.373	10.373	WASTE	PAG
2016	PIT	650	N650027	204	1	7	46.9	-40	0.15	0.01	1.5	7914850.35	563380.556	660.559	10.559	WASTE	PAG
2016	PIT	650	N650027	106	1	8	52.8	-45	0.15	0.005	1.69	7914853.32	563378.653	660.22	10.22	WASTE	PAG
2016	PIT	650	N650027	108	1	7	33.8	-27	0.21	0.01	1.08	7914848.14	563376.667	660.241	10.241	ORE/WASTE	PAG
2016	PIT	650	N650027	114	1	3	14.7	-12	0.2	0.005	0.47	7914830.85	563369.715	660.215	10.215	ORE/WASTE	PAG
2016	PIT	650	N650027	120	1	3	20	-17	0.15	0.005	0.64	7914814.12	563362.196	660.327	10.327	ORE/WASTE	PAG
2016	PIT	650	N650027	117	1	5	20.9	-16	0.24	0.005	0.67	7914822.25	563365.741	660.324	10.324	ORE/WASTE	PAG
2016	PIT	650	N650027	206	1	6	34.4	-28	0.17	0.03	1.1	7914842.92	563377.126	660.056	10.056	ORE/WASTE	PAG
2016	PIT	650	N650027	103	1	9	33.8	-25	0.27	0.01	1.08	7914860.44	563381.714	660.365	10.365	ORE/WASTE	PAG
2016	PIT	650	N650027	214						0.01	0.39	7914813.52	563364.526	660.374	10.374	ORE/WASTE: MAGNETITE	PAG
2016	PIT	650	N650027	212	1	5	18.8	-14	0.27	0.005	0.6	7914820.78	563367.678	660.445	10.445	ORE/WASTE	PAG
2016	PIT	650	N650028	109	1	15	51.6	-37	0.29	0.69	1.65	7914749.76	563303.509	659.972	9.972	ORE/WASTE: MAGNETITE	PAG
2016	PIT	650	N650028	200	1	8	6.6	1	1.22	0.34	0.21	7914729.02	563284.965	659.973	9.973	ORE/WASTE: HEMATITE	PAG
2016	PIT	650	N650028	112	1	13	21.9	-9	0.59	0.81	0.7	7914756.04	563309.928	659.88	9.88	ORE/WASTE: MAGNETITE	PAG
2016	PIT	650	N650028	116	1	6	45.9	-40	0.13	0.51	1.47	7914764.53	563319.103	659.669	9.669	WASTE	PAG
2016	PIT	650	N650028	212	1	10	13.1	-3	0.76	0.83	0.42	7914760.64	563318.806	659.86	9.86	ORE/WASTE: MAGNETITE	PAG
2016	PIT	650	N650028	120	1	7	26.9	-20	0.26	0.22	0.86	7914772.25	563327.423	659.673	9.673	WASTE	PAG
2016	PIT	650	N650028	214	1	9	13.1	-4	0.69	0.53	0.42	7914766.34	563324.887	659.693	9.693	ORE/WASTE: MAGNETITE	PAG
2016	PIT	650	N650028	115	1	10	14.7	-5	0.68	0.31	0.47	7914762.52	563317.093	659.668	9.668	ORE/WASTE	PAG
2016	PIT	650	N650028	221						0.03	0.45	7914785.67	563345.069	660.179	10.179	ORE/WASTE	PAG
2016	PIT	650	N650028	118						0.51	0.72	7914768.17	563323.217	659.597	9.597	WASTE	PAG
2016	PIT	650	N650028	122						0.07	0.81	7914776.4	563331.816	659.648	9.648	WASTE	PAG
2016	PIT	650	N650028	219						0.02	0.24	7914780.03	563339.489	659.933	9.933	ORE/WASTE	PAG
2016	PIT	650	N650031	222	1	3	27.5	-25	0.11	0.01	0.88	7914696.66	563250.909	660.056	10.056	WASTE: CHLORITE SCHIST	PAG
2016	PIT	650	N650031	230	1	4	20.3	-16	0.2	0.03	0.65	7914718.19	563274.007	660.097	10.097	WASTE: CHLORITE SCHIST	PAG
2016	PIT	650	N650031	226	1	-12	160.3	-172	-0.07	0.01	5.13	7914707.36	563262.161	660.036	10.036	WASTE: CHLORITE SCHIST	PAG
2016	PIT	650	N650047	109	1	7	24.7	-18	0.28	0.04	0.79	7914657.84	563206.41	660.457	10.457	GREEN SCHIST	PAG
2016	PIT	650	N650047	1113	1	6	41.6	-36	0.14	0.17	1.33	7914668.14	563236.179	660.507	10.507	ORE/WASTE	PAG
2016	PIT	650	N650047	108	1	10	7.5	3	1.33	0.07	0.24	7914655.92	563204.415	660.254	10.254	ORE/WASTE	PAG
2016	PIT	650	N650047	1115	1	10	7.2	3	1.39	0.01	0.23	7914673.92	563240.85	660.148	10.148	GREEN SCHIST	PAG
2016	PIT	650	N650047	1312	1	7	17.2	-10	0.41	0.06	0.55	7914669.97	563228.112	660.436	10.436	ORE/WASTE	PAG
2016	PIT	650	N650047	1112	1	3	24.1	-21	0.12	0.03	0.77	7914664.69	563233.21	660.471	10.471	ORE/WASTE	PAG
2016	PIT	650	N650047	1307	1	6	24.4	-18	0.25	0.04	0.78	7914653.5	563210.327	660.752	10.752	GREEN SCHIST	PAG
2016	PIT	650	N650047	1309	1	9	33.8	-25	0.27	0.11	1.08	7914660.13	563217.594	660.231	10.231	GREEN SCHIST	PAG
2016	PIT	650	N650047	1110	1	3	12.8	-10	0.23	0.06	0.41	7914657.85	563226.028	660.485	10.485	ORE/WASTE	PAG
2016	PIT	650	N650047	107	1	8	43.4	-35	0.18	0.02	1.39	7914653.74	563202.307	660.254	10.254	GREEN SCHIST	PAG
2016	PIT	650	N650047	1111	1	-1	28.4	-29	-0.04	0.02	0.91	7914661.22	563229.436	660.572	10.572	ORE/WASTE	PAG
2016	PIT	650	N650047	1308	1	9	161.6	-153	0.06	0.01	5.17	7914656.55	563213.731	660.237	10.237	GREEN SCHIST	PAG
2016	PIT	650	N650047	106	1	8	17.5	-10	0.46	0.06	0.56	7914651.61	563200.127	660.286	10.286	GREEN SCHIST	PAG
2016	PIT	650	N650047	100	1	4	11.6	-8	0.35	0.01	0.37	7914639.85	563187.392	660.237	10.237	ORE/WASTE	PAG
2016	PIT	650	N650047	1311	1	-5	69.4	-74	-0.07	0.06	2.22	7914666.61	563224.434	660.218	10.218	ORE/WASTE	PAG
2016	PIT	650	N650047	101	1	3	9.7	-7	0.31	0.05	0.31	7914641.3	563189.165	660.28	10.28	ORE/WASTE	PAG
2016	PIT	650	N650047	122	1	7	6.6	0	1.07	0.01	0.21	7914683.53	563234.263	659.931	9.931	ORE/WASTE	PAG
2016	PIT	650	N650047	102	1	-4	9.7	-14	-0.41	0.01	0.31	7914643.37	563191.352	660.312	10.312	ORE/WASTE	PAG
2016	PIT	655	N650047	1305	1	1	19.1	-18	0.05	0.02	0.61	7914646.99	563203.733	660.474	5.474	GREEN SCHIST	PAG
2016	PIT	650	N650047	1310	1	-4	37.5	-42	-0.11	0.03	1.2	7914663.82	563221.106	660.183	10.183	ORE/WASTE	PAG
2016	PIT	650	N650047	105	1	-2	30.9	-33	-0.06	0.04	0.99	7914649.59	563197.845	660.351	10.351	ORE/WASTE	PAG
2016	PIT	650	N650047	121	1	6	6.6	-1	0.91	0.02	0.21	7914682.49	563232.584	659.808	9.808	ORE/WASTE	PAG
2016	PIT	650	N650048	108	1	8	69.1	-61	0.12	0.51	2.21	7914620.06	563166.594	659.985	9.985	WASTE	PAG
2016	PIT	650	N650048	106	1	8	22.2	-14	0.36	0.005	0.71	7914624.47	563170.966	659.983	9.983	WASTE	PAG
2016	PIT	650	N650048	104	1	8	15	-7	0.53	0.005	0.48	7914628.24	563175.375	660.187	10.187	ORE/WASTE	PAG
2016	PIT	650	N650048	110	1	9	9.1	0	0.99	0.04	0.29	7914615.85	563162.492	659.97	9.97	WASTE	PAG
2016	PIT	650	N650048	102	1	8	7.2	1	1.11	0.01	0.23	7914632.85	563179.588	660.02	10.02	ORE/WASTE	PAG
2016	PIT	650	N650048	100	1	5	6.9	-2	0.73	0.005	0.22	7914636.61	563182.987	660.137	10.137	ORE/WASTE	PAG
2016	PIT	650	N650048	1202	1	5	6.9	-2	0.73	0.03	0.22	7914628.93	563183.912	660.218	10.218	ORE/WASTE	PAG
2016	PIT	660	N660032	131						0.26	1.35	7914620.59	563161.568	667.709	7.709	GREEN SCH.	PAG
2016	PIT	660	N660032	222	1	8	39.7	-32	0.2	0.04	1.27	7914619.57	563162.881	667.704	7.704	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	201						0.07	0.24	7914659.23	563204.62	667.388	7.388	GREEN SCH.	PAG
2016	PIT	660	N660032	123	1	11	36.6	-26	0.3	0.01	1.17	7914632.03	563173.615	666.774	6.774	GREEN SCH.	PAG
2016	PIT	660	N660032	223	1	9	36.9	-28	0.24	0.12	1.18	7914617.94	563160.538	667.75	7.75	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	125	1	8	33.4	-25	0.24	0.02	1.07	7914628.83	563170.203	666.777	6.777	GREEN SCH.	PAG
2016	PIT	660	N660032	1305	1	12	15.9	-4	0.75	0.01	0.51	7914644.24	563194.359	667.24	7.24	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	217	1	7	13.1	-6	0.53	0.01	0.42	7914629.04	563172.923	666.718	6.718	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660032	1204	1	7	11.6	-5	0.61	0.03	0.37	7914646.23	563202.342	667.305	7.305	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	212	1	12	10.6	1	1.13	0.01	0.34	7914638.44	563182.88	667.017	7.017	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	127	1	8	40.9	-33	0.2	0.03	1.31	7914625.6	563167.005	667.249	7.249	GREEN SCH.	PAG
2016	PIT	660	N660032	121	1	11	38.4	-27	0.29	0.03	1.23	7914634.66	563176.379	666.854	6.854	GREEN SCH.	PAG
2016	PIT	660	N660032	211	1	12	11.3	1	1.07	0.02	0.36	7914640.86	563185.362	667.032	7.032	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	1306	1	9	25.3	-16	0.36	0.01	0.81	7914641.11	563190.822	667.27	7.27	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	107	1	6	9.4	-3	0.64	0.13	0.3	7914653.97	563196.659	667.165	7.165	GREEN SCH.	PAG
2016	PIT	660	N660032	130						0.08	0.95	7914622.07	563163.09	667.56	7.56	WASTE/GREEN SCH.	PAG
2016	PIT	660	N660032	215	1	8	10	-2	0.8	0.02	0.32	7914632.69	563176.764	666.748	6.748	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660032	216	1	9	12.5	-4	0.72	0.02	0.4	7914630.9	563174.935	666.837	6.837	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660032	221	1	10	34.4	-24	0.29	0.06	1.1	7914621.49	563164.785	667.556	7.556	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	1314	1	5	14.4	-9	0.35	0.15	0.46	7914614.72	563162.835	667.773	7.773	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660032	1303	1	9	71.9	-63	0.13	0.02	2.3	7914650.91	563201.124	667.336	7.336	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	202						0.09	0.29	7914657.36	563202.887	667.384	7.384	GREEN SCH.	PAG
2016	PIT	660	N660032	129	1	9	17.5	-9	0.51	0.03	0.56	7914623.55	563164.695	667.388	7.388	Waste: BIF	PAG
2016	PIT	660	N660032	115						0.13	0.67	7914642.95	563185.09	667.117	7.117	GREEN SCH.	PAG
2016	PIT	660	N660032	111	1	4	21.3	-17	0.19	0.04	0.68	7914648.76	563191.263	667.148	7.148	ORE/WASTE/HEMATITE	PAG
2016	PIT	660	N660032	119						0.15	0.56	7914637.15	563179.041	666.928	6.928	ORE/WASTE/HEMATITE	PAG
2016	PIT	660	N660032	218	1	5	8.1	-3	0.62	0.03	0.26	7914627.09	563170.916	666.823	6.823	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660032	203						0.02	0.53	7914655.48	563200.802	667.262	7.262	GREEN SCH.	PAG
2016	PIT	660	N660032	220	1	8	18.4	-10	0.43	0.06	0.59	7914623.41	563166.759	667.376	7.376	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660032	117						0.07	1.02	7914639.97	563181.979	667.087	7.087	WASTE/GREEN SCH.	PAG
2016	PIT	660	N660032	1304	1	9	32.2	-23	0.28	0.07	1.03	7914647.71	563197.748	667.273	7.273	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660032	1302						0.05	2.96	7914654.21	563204.714	667.332	7.332	GREEN SCH.	PAG
2016	PIT	660	N660032	105	1	4	15	-11	0.27	0.09	0.48	7914656.63	563199.606	667.331	7.331	GREEN SCH.	PAG
2016	PIT	660	N660032	204						0.01	0.88	7914653.54	563198.898	667.196	7.196	ORE	PAG
2016	PIT	660	N660032	207						0.02	1.88	7914647.94	563192.804	667.172	7.172	ORE	PAG
2016	PIT	660	N660032	219	1	6	8.1	-2	0.74	0.05	0.26	7914625.23	563168.889	667.096	7.096	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660032	113						0.07	1.58	7914645.6	563188.035	667.133	7.133	ORE/WASTE	PAG
2016	PIT	660	N660032	224	1	4	7.8	-4	0.51	0.1	0.25	7914615.8	563158.918	667.719	7.719	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660032	109	1	1	22.8	-22	0.04	0.04	0.73	7914651.17	563193.778	667.083	7.083	ORE/WASTE/HEMATITE	PAG
2016	PIT	660	N660032	208						0.01	1.44	7914646.05	563190.785	667.119	7.119	ORE: GREEN SCH.	PAG

Baffinland

TABLE D.5.3
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
DEPOSIT 1 PAG GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED WASTE ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	Lithology	CLASS
2016	PIT	660	N660032	205						0.01	0.79	7914651.64	563196.866	667.202	7.202	ORE	PAG
2016	PIT	660	N660032	206						0.03	1	7914649.85	563194.843	667.13	7.13	ORE	PAG
2016	PIT	660	N660033	5018	1	5	46.3	-41	0.11	0.01	1.48	7914663.41	563225.696	668.197	8.197	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	5017	1	6	125.6	-120	0.05	0.01	4.02	7914667.32	563229.592	668.171	8.171	WASTE	PAG
2016	PIT	660	N660033	5019	1	7	26.6	-20	0.26	0.01	0.85	7914660.47	563223.099	667.943	7.943	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	1015	1	6	86.3	-80	0.07	0.03	2.76	7914711.37	563257.378	667.762	7.762	WASTE	PAG
2016	PIT	660	N660033	1013	1	5	50.6	-46	0.1	0.01	1.62	7914714.18	563260.602	667.523	7.523	WASTE: GREEN SCH.	PAG
2016	PIT	660	N660033	1014	1	3	43.1	-40	0.07	0.01	1.38	7914713.1	563259.285	667.56	7.56	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	1016	1	3	33.8	-31	0.09	0.01	1.08	7914710.33	563256.291	667.759	7.759	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	2005	1	2	10.6	-9	0.19	0.01	0.34	7914719.17	563268.204	667.596	7.596	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	1017	1	2	10.3	-8	0.19	0.01	0.33	7914709.04	563255.01	667.818	7.818	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	5022						0.01	0.28	7914650.88	563212.209	667.594	7.594	ORE: HEMATITE	PAG
2016	PIT	660	N660033	3013						0.07	0.25	7914685.71	563237.66	667.969	7.969	ORE: HEMATITE	PAG
2016	PIT	660	N660033	4018	1	7	184.7	-178	0.04	0.01	5.91	7914666.03	563223.701	668.173	8.173	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	4019	1	8	9.4	-1	0.85	0.01	0.3	7914663.07	563220.257	667.629	7.629	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	4015	1	10	7.5	3	1.33	0.01	0.24	7914676.17	563233.943	667.897	7.897	WASTE	PAG
2016	PIT	660	N660033	4016	1	6	6.9	-1	0.87	0.01	0.22	7914672.74	563230.535	668.117	8.117	WASTE	PAG
2016	PIT	660	N660033	4008	1	9	10	-1	0.9	0.01	0.32	7914699.8	563259.025	667.842	7.842	WASTE	PAG
2016	PIT	660	N660033	3009	1	4	24.7	-21	0.16	0.04	0.79	7914698.97	563251.8	667.944	7.944	WASTE	PAG
2016	PIT	660	N660033	2010	1	10	64.7	-55	0.15	0.01	2.07	7914706.87	563255.817	667.765	7.765	WASTE	PAG
2016	PIT	660	N660033	2009	1	10	66.9	-57	0.15	0.01	2.14	7914709.58	563257.934	667.629	7.629	WASTE	PAG
2016	PIT	660	N660033	2011	1	3	50	-47	0.06	0.01	1.6	7914704.9	563252.988	667.999	7.999	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	2006	1	3	15	-12	0.2	0.01	0.48	7914716.49	563265.448	667.481	7.481	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660033	1021	1	-2	7.2	-9	-0.28	0.01	0.23	7914703.55	563248.857	668.143	8.143	ORE/WASTE: HEMATITE	PAG
2016	PIT	660	N660041	105	1	7	7.5	-1	0.93	0.05	0.24	7914495.27	563079.909	666.874	6.874	WASTE	PAG
2016	PIT	667	N667047	2107	1	5	6.9	-2	0.73	0.005	0.22	7914731.88	563225.476	674.935	7.935	WASTE	PAG
2016	PIT	667	N667047	2310	1	11	11.9	-1	0.93	0.04	0.38	7914736.6	563210.144	674.876	7.876	WASTE	PAG
2016	PIT	667	N667047	2111	1	13	9.1	4	1.43	0.01	0.29	7914745.14	563212.534	674.892	7.892	WASTE	PAG
2016	PIT	667	N667047	2403	1	7	6.6	0	1.07	0.01	0.21	7914708.29	563232.447	674.942	7.942	WASTE	PAG
2016	PIT	667	N667047	2304	1	7	45.6	-39	0.15	0.02	1.46	7914715.79	563230.393	674.965	7.965	WASTE	PAG

MEMO

To	**Laura Taylor and William Bowden (Baffinland)**	File no	**TC170202**
From	**Steve Walker and Jennifer Boak (Amec Foster Wheeler)**	cc	**Andrew Vermeer and Adam Grzegorczyk (Baffinland) Steve Sibbick (Amec Foster Wheeler)**
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Date	**15 March 2017**		

Subject **Mary River Project**
2017 Review of Mine Rock Humidity Cell Program

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler, formerly AMEC) has been retained by Baffinland Iron Mines Corporation (Baffinland) to conduct ML/ARD characterization of mine rock for Deposit 1 of the Mary River Project. On-going studies in support of this project include humidity cell testing of selected mine rock samples. The objective of this technical memorandum is to provide an updated review of mine rock humidity cell results that have been received since the last humidity cell update was issued on 24 March 2016, titled *Mary River Project 2016 Review of Mine Rock Humidity Cell Program* (Amec Foster Wheeler 2016).

2.0 HUMIDITY CELL OVERVIEW

The mine rock humidity cell testing program includes eleven standard humidity cells and eight carbonate depleted cells (nineteen cells in total). Eight of the nineteen humidity cells have been terminated, as recommended by AMEC in June 2014. At that time, AMEC also recommended the initiation of two new standard humidity cells (16628 and 16634) to represent previously untested mineralized waste materials expected to be present in mine rock stockpiles in generally low tonnages. The operational status of all nineteen mine rock humidity cells is provided in Table 1. Previous documentation and analysis of mine rock humidity cell data is provided in the document *Mine Rock ML/ARD Geochemical Characterization Report – Deposit 1, Mary River Project* (AMEC 2014).

A representative set of samples were selected for humidity cell analysis based on a static testing program that was conducted in 2010. The samples for humidity cell testing were selected primarily to assist with refining the threshold between potentially acid generating (PAG) and non-PAG materials, and to better understand the effectiveness of non-carbonate neutralization potential (NP) in limiting low pH drainage. The selected samples are well distributed spatially across the deposit and include a range of metal contents. The representativeness of the humidity cells in relation to acid potential (AP), NP, and metal contents are provided graphically in Appendix A.

2.1 Standard Humidity Cells

The purpose of testing using standard humidity cells (herein referred to as ‘humidity cells’) was to assess the lag time to net acidic conditions of PAG samples with different ranges of AP and NP contents. A second objective was to more carefully assess the threshold between PAG and non-PAG materials, which have been defined only on the basis of static testing (e.g. acid base accounting) and assuming all materials with an NPR (neutralization potential ratio, or NP/AP) less than two are PAG. Humidity cell testing of materials with NPR values between 1 and 2 may provide better information on what the appropriate NPR threshold to segregate acid generating from non-acid generating rock will be and how effective categorization of PAG and non-PAG based on NP is for these materials with generally low rates of sulphide oxidation rate and low NP.

A humidity cell program was previously conducted for 53 weeks on ten rock samples from the Mary River project in early 2008 (Knight Piésold, 2008). Five of the samples each represented a single lithology, while the others were of mixed lithology or consisted of composites of two or more lithologies. In addition, one of the samples had a sulphide content of 5% which is considered high for mine rock at the project site.

The current standard humidity cell testing program was initiated by Amec Foster Wheeler in May 2011. Selection of samples was primarily focused on the three main lithologies (gneiss, schist and volcanic tuff) and covered a range of sulphide and metals content. An upper sulphide content limit of around 1% was considered to be representative of most of the PAG rocks based on available ABA data. Representative rock samples with NPR <2 were selected from the major hanging wall and footwall lithologies. Several non-PAG samples (NPR >2) were also included to provide information on the broader range of rock compositions expected in the future mine rock stockpile.

Static test results for the humidity cell samples are presented in Table 2. Nine rock samples representing major lithologies of hanging wall and footwall rock were selected for humidity cell testing based on the waste subdivisions available at the time. Samples have since been categorized according to updated waste type subdivisions (FW, FWS, HW, HWS, IW – see AMEC 2014). A single sample of magnetite dominant ore was also included in the program.

2.2 Depleted Neutralization Potential Humidity Cells

The results of ABA testing on the Mary River Deposit No.1 samples indicated that the carbonate NP of the samples was generally low compared to the modified Sobek NP. A large portion of samples (approximately 76%) had carbonate NP that was 20% or less than the Sobek NP. These results suggest that silicate minerals are the long-term source of NP after the carbonate minerals are exhausted. Silicate minerals are reportedly able to buffer mine waste pH at near neutral conditions under low acid generation rates (Mattson, 2009; Miller et al., 2010). However, the effectiveness of silicate NP is dependent on the material and particularly the specific minerals present, and sulphide reaction rates.

To test the effectiveness of silicate NP, specialized carbonate NP-depleted humidity cells were initiated in September 2011. These cells are being operated to assess the drainage chemistry of mine rock devoid of carbonate neutralization capacity. Samples were subjected to a sodium acetate leach prior to placement in the cells to dissolve and remove carbonate minerals prior to testing.

Eight samples from the major lithologies (gneiss, schist and volcanic tuff) were selected for NP-depleted humidity cell testing (Table 2).

2.3 Mineralized Waste Humidity Cells

In 2014, Amec Foster Wheeler initiated two additional humidity cells representing mineralized waste: one typical banded iron formation mine rock sample and one typical high grade iron formation mine rock sample. These were initiated to better assess the possible future impact of these previously untested, low tonnage materials that are expected to make up less than 1% of the mine rock.

3.0 RESULTS AND ANALYSIS

A summary of ABA and key metal characteristics (copper, nickel and zinc) for each cell are provided in Table 2. Summary static data for the cells and statistical distribution of the cells in comparison to the range of ABA and selected metals data are provided in Appendix A. Humidity cell data plots for the nineteen cells are presented in Appendix B, and are grouped as Hangingwall, Footwall, and Mineralized Waste.

Overall, the humidity cell results continue to exhibit a protracted period of generally circum-neutral pH (with a few exceptions) over the duration of testing (now at over 5.5 years of operation) indicating that PAG mine rock is expected to exhibit an extended lag time to acid on-set, perhaps on the order of a decade or longer under field conditions, even in the absence of neutralization capacity from carbonates.

3.1 Hanging wall and Footwall Humidity Cells

Based on over five years of data for NP depleted humidity cells, the following observations are made regarding the hanging wall and footwall humidity cells:

- The pH of most cells exhibited a gradual declining trend over test duration with the following exceptions:
    - Hanging wall schist sample (MRARD10-092) reported generally steady pH between 6 and 7 for the duration of the test;
    - NP-depleted footwall gneiss samples MRARD10-057 and MRARD10-123 reported a generally steady pH between 6 and 7 prior to termination in week 154 after approximately 3 years of testing; and
- Throughout testing, the pH of most of the cells showed a slightly declining trend but maintained pH values generally between 5.5 to 7 with the following exceptions:

- A low sulphide (0.06% sulphide) NP depleted cell containing hanging wall volcanic tuff (MRARD10-82) exhibited pH values that have fluctuated between 4.5 and 6 over the duration of testing. After week 200, pH values fluctuated between 4.6 and 5.5;

- Two footwall cells (MRARD10-055 and MRARD10-074) exhibited gradually declining pH throughout testing, reaching pH values below 5 after between 2 and 3 years of operation; and,

- One footwall cell (5178) exhibited gradually declining pH throughout testing, reaching the lowest observed pH, slightly above 4, within the first three years of operation and has remained generally steady in this range over the subsequent 2.5 years. This cell contained the second highest sulphide content (0.9%) of all of the humidity cells.

- Sulphate release rates for most cells generally declined in the first 20 weeks of operation and subsequently exhibited a stable trend or continued to steadily decline at a slow rate with these exceptions:

  - NP Depleted hanging wall schist sample MRARD10-026, which showed fluctuating sulphate release rates between 2 mg/kg/wk and 30 mg/kg/wk over the last 2.5 years; and

  - Footwall schist sample 5178 which showed slightly increasing sulphate release rates between 20 mg/kg/wk and 50 mg/kgwk over approximately the last three years.

- Sulphate release rate weakly correlates to sulphide content;

  - The two highest average sulphate release rates of 23 mg/kg/wk and 29 mg/kg/wk were reported by humidity cell samples 5178 and MRARD10-074, which also reported the highest solid phase sulphide concentrations of 0.9% and 1%.

  - The two lowest average sulphate release rates of 0.70 mg/kg/wk and 0.67 mg/kg/wk were reported by humidity cell samples 5172 and 5174, which also reported the lowest solid phase sulphide concentrations of 0.015% and 0.011%.

  - Humidity cells with solid phase sulphide concentrations between 0.05% 0.3% reported average sulphate release rates between 2 mg/kg/wk and 9 mg/kg/wk that generally correlated to sulphide content.

- Two footwall cells (MRARD10-055, MRARD10-123) exhibited a gradual increasing trend in sulphate release after the first 20 weeks of operation becoming generally steady after 50 to 100 weeks of operation. Cell MRARD10-123 was terminated after 154 weeks of testing.

- The highest steady sulphate release rates were observed for footwall samples 5178 and MRARD10-074, and ranged between 10 mg/kg/wk and 40 mg/kg/wk. These cells had the highest footwall sulphide content of 0.9% and 0.6% respectively. Hangingwall samples with similar sulphide content reported lower sulphate release rates prior to termination (MRARD10-080 reported 10 mg/kg/wk sulphate; MRARD10-105 reported 3 mg/kg/wk sulphate).

- One hangingwall cell (MRARD10-051) at approximately 150 weeks of operation exhibited a spurious spike in sulphate and associated metals release (especially iron) prior to termination. This is inferred to represent sudden dissolution of a minute sulphide grain (e.g. 0.5 mg as pyrite) in this cell at that time.

- NP depleted hanging wall cell MRARD10-026 reported fluctuating but generally increasing sulphate release rates generally near 10 mg/kg/wk in the last year of testing. This cell reported a solid phase sulphide concentration of 0.2%.

- The carbonate molar ratio or CMR [(Ca+Mg)/SO_4] for most cells is in the range of 0.5 to 1.5 with a few cells that had CMRs as low as 0.1, and two cells with CMRs near two. CMRs in the range of 1 to 2 are expected for cells where acidity generated by sulphide oxidation is neutralized by carbonate dissolution. However, the Baffinland humidity cell samples are known to be very low in carbonate, or are carbonate depleted. The majority of cells also show the release of magnesium at higher rates than calcium on a molar basis, suggesting that dissolution of non-carbonate minerals is occurring; perhaps biotite and/or chlorite.

- Based on depletion calculations, only three cells (5171, MRARD10-105 and MRARD10-120) are inferred to still contain carbonate minerals after their respective testing periods. Only cell 5171 continues to operate. Cells MRARD10-105 and MRARD10-120 were terminated after approximately three years of testing.

- Footwall cell 5171 with low but relatively elevated carbonate NP in comparison to other test materials (2.8 kg $CaCO_3$/t) notably exhibited initially high CMRs that reached a CMR of 5 after the first 20 weeks of operation and then gradually declined to approximately 2 after 140 weeks. This suggests that sulphide oxidation was low enough before 140 weeks that a significant component of the carbonate NP was being depleted by the weakly acidic deionized water flush alone.

- For all cells except those with leachate pH values below five, 12 elements (Ag, Al, As, Be, Bi, Cr, Li, Pb, Sb, Tl, W and Zn) had leachate concentrations that were generally at or near detection.

- Metal release rates are generally the highest in the lower pH humidity cells with notable release rates for Cd, Co, Cu, Ni, Pb and Zn in cells MRARD10-055 and 5178 which also contain near worst case solid concentrations for these metals in Deposit 1 mine rock.

- The noted elevated metal release rates for cells MRARD10-055 and 5178 exhibited increasing metal release trends over the first 50 to 100 weeks of operation and have since exhibited steady or declining trends.

3.2 Mineralized Waste Humidity Cells

Based on 125 weeks of data for the mineralized waste humidity cells, the following observations are provided:

- The pH of the banded iron formation humidity cell was acidic and ranged between pH 4.2 and pH 4.9 over the test period.

- The pH of the high grade iron formation mine rock cell was generally steady and circum-neutral between pH 6 and pH 7 over the test period.

- Sulphate release rates gradually decreased throughout testing to values below 7 mg/kg/wk for the high grade iron formation cell and below 10 mg/kg/wk for the internal waste banded iron formation cell after week 120.

- Metal release rates generally decreased to approximately steady release rates after week 50 for both samples, with generally higher metal release rates observed for the lower pH banded iron formation cell as expected.

- Some metals may be showing increasing release rates in the High Grade Iron Formation sample after approximately week 100 (Ag, Ba, Co, Cu, Si).

4.0 REFERENCES

Amec Foster Wheeler, 2016. Mary River Project 2016 Review of Mine Rock Humidity Cell Program. Issued 24 March 2016.

AMEC, 2014. Mine Rock ML/ARD Characterization Report – Deposit 1, Mary River Project.

Knight Piésold. 2008. Baffinland Iron Mines Corporation, Mary River Project Environmental Characterization of Deposit No.1 Waste Rock, Ore & Construction Material. Ref. No. NB102-00181/11-7. Draft Report, Prepared for Baffinland Ion Mines Corporation.

Miller, S.D. Stewart, S.W. Rusdinar, Y. Schuman. et al. 2010. Methods for Estimation of Long-Term Non-Carbonate Neutralization of Acid Rock Drainage. Science of the total Environment 408, pp. 2129-2135.

Tables:

Table 1 – Mine Rock Humidity Cell Operational Status
Table 2 – Mine Rock Humidity Cell Static Data

Appendices:

Appendix A – Mine Rock Humidity Cell Static Data Plots
Static Data ABA Plots
Static Data Cumulative Frequency Plots

Appendix B – Mine Rock Humidity Cell Results
Hanging Wall and Footwall Humidity Cell Plots
Mineralized Waste Humidity Cell Plots

TABLES

TABLE 1:
Mine Rock Humidity Cell Operational Status

Humidity Cell	Type	Lithology	Weeks in Operation	Status
5171	Standard HC	FW-Metasediment	295	Ongoing
5178	Standard HC	FW-Schist	298	Ongoing
MRARD 10-030	Standard HC	FW-Gneiss	298	Ongoing
MRARD 10-055	Standard HC	FWS-Gneiss	298	Ongoing
MRARD 10-074	Standard HC	FWS-Gneiss	298	Ongoing
MRARD 10-080	Standard HC	HWS-Volcanic Tuff	170	Terminated
MRARD 10-092	Standard HC	HWS-Schist	298	Ongoing
MRARD 10-105	Standard HC	HWS-Volcanic Tuff	170	Terminated
MRARD 10-120	Standard HC	OZ-Schist	170	Terminated
16628	Standard HC	HWS - High Grade Iron Formation	126	Ongoing
16634	Standard HC	Internal Waste - Banded Iron Formation	126	Ongoing
5172	NP Depleted HC	FW-Metasediment	154	Terminated
5174	NP Depleted HC	FW-Gniess	154	Terminated
MRARD10-026	NP Depleted HC	HWS-Schist	282	Ongoing
MRARD10-048	NP Depleted HC	FW-Schist	282	Ongoing
MRARD10-051	NP Depleted HC	HWS-Volcanic Tuff	154	Terminated
MRARD10-057	NP Depleted HC	FWS-Gniess	154	Terminated
MRARD10-082	NP Depleted HC	HW-Volcanic Tuff	282	Ongoing
MRARD10-123	NP Depleted HC	FWS-Gniess	154	Terminated

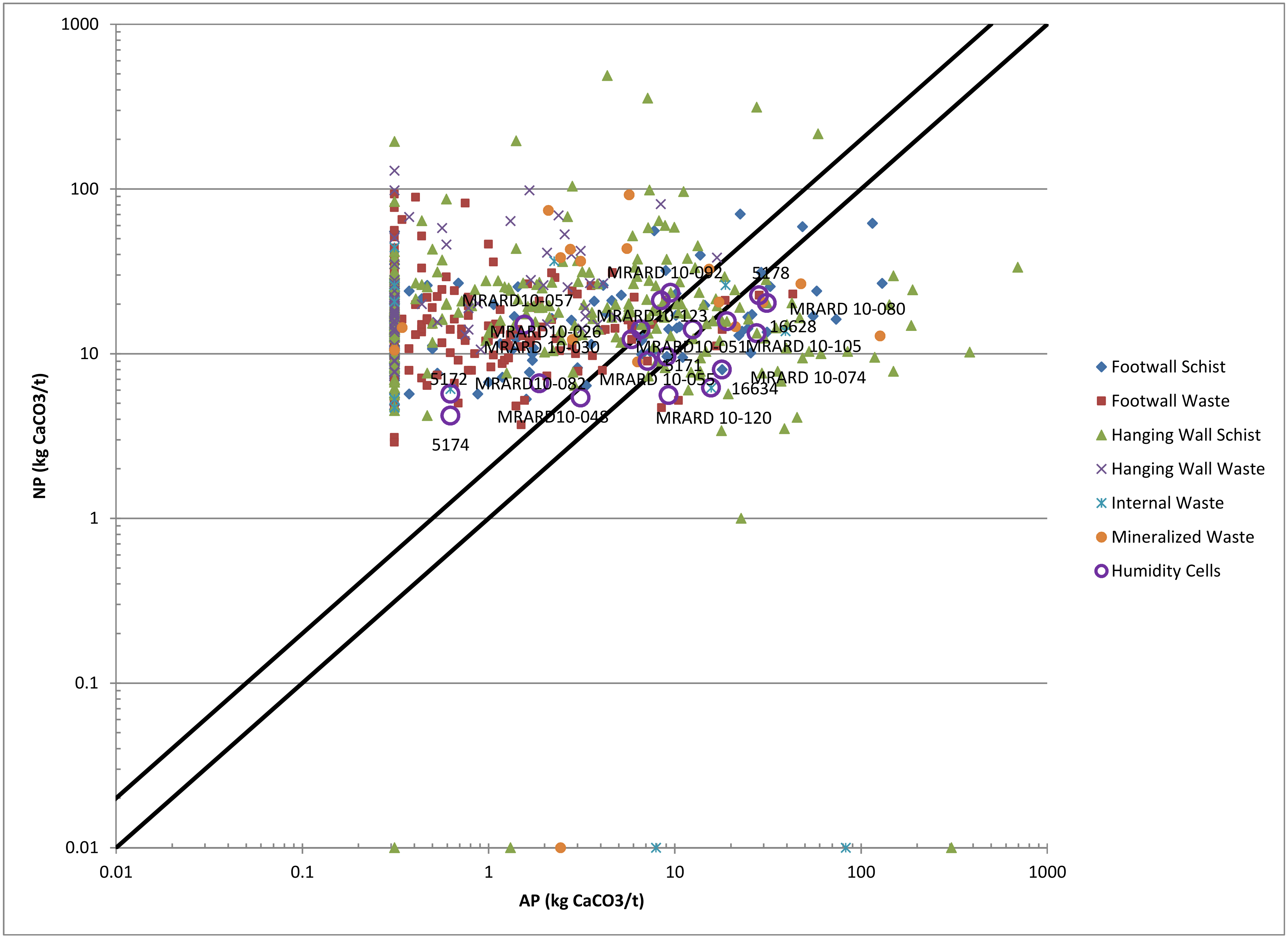
TABLE 2:
Mine Rock Humidity Cell Static Data

Sample ID	Borehole ID	Waste Classification	Lithology	Humidity Cell Type	Total Sulphur	Sulphide	AP*	NP	CarbNP**	Non CarbNP	Non CarbNP	NPR	CarbNPR	Cu	Ni	Zn	Cu	Ni	Zn
					%		kg $CaCO_3$/t				%			ppm			Percentile of All Data		
MRARD10-055	MR1-08-159	Footwall Schist	Gniess	Standard	0.36	0.29	9.1	9.6	0.083	9.5	99	1.1	0.055	22	37	32	0.51	0.53	0.39
MRARD10-057	MR1-08-161	Footwall Schist	Gniess	NP Depleted [1]	0.19	0.05	1.5	15	<0.083	14.9	99	10	1.3	29	15	24	0.59	0.30	0.26
MRARD10-074	MR1-08-149	Footwall Schist	Gniess	Standard	0.66	0.58	18	8.0	1.6	6.4	80	0.44	0.087	67	620	100	0.80	0.99	0.94
MRARD10-123	MR1-08-155	Footwall Schist	Gniess	NP Depleted [1]	0.42	0.27	8	21	<0.083	21	100	2.5	0.18	31	6.0	21	0.62	0.08	0.21
MRARD10-048	MR1-08-163	Footwall Schist	Schist	NP Depleted [1]	0.19	0.11	3.3	5	<0.083	5.3	98	1.6	1.0	48	130	42	0.73	0.83	0.53
5174	ARD-2B-NW	Footwall Waste	Gniess	NP Depleted [1]	0.061	0.011	0.3	4.2	<0.083	4.1	98	12	5.1	17	5.7	30	0.44	0.08	0.35
MRARD10-030	MR1-09-170	Footwall Waste	Gniess	Standard	0.27	0.19	5.9	12	0.83	11.4	93	2.1	0.21	30	50	722	0.60	0.60	1.00
5171	ARD-2A-SE	Footwall Waste	Metasediment	Standard	0.40	0.23	7.2	9.0	2.8	6.2	69	1.3	0.63	92	4.0	26	0.86	0.02	0.28
5172	ARD-2A-SE	Footwall Waste	Metasediment	NP Depleted [1]	0.12	0.015	0.5	6	<0.083	5.6	99	12	5.0	43	5.1	17	0.70	0.06	0.16
5178	ARD-2B-NW	Footwall Waste	Schist	Standard	1.5	0.91	28	23	1.5	21.1	93	0.79	0.053	5.8	46	14	0.19	0.58	0.11
MRARD10-026	MR1-09-173	Hanging Wall Schist	Schist	NP Depleted [1]	0.67	0.21	6.6	14	<0.083	13.9	99	2.1	0.38	33	110	51	0.64	0.77	0.67
MRARD10-092	MR1-08-142	Hanging Wall Schist	Schist	Standard	0.59	0.31	9.7	23	<0.083	23.3	100	2.4	0.052	9.4	6.9	9.4	0.30	0.11	0.06
MRARD10-051	MR1-08-158	Hanging Wall Schist	Volcanic Tuff	NP Depleted [1]	0.65	0.39	12.2	14	<0.083	13.9	99	1.1	0.27	98	48	38	0.88	0.59	0.46
MRARD10-080	MR1-08-149	Hanging Wall Schist	Volcanic Tuff	Standard	1.3	1.0	31	20	0.13	20.2	99	0.65	0.024	2.3	45	30	0.07	0.58	0.35
MRARD10-105	MR1-08-141	Hanging Wall Schist	Volcanic Tuff	Standard	0.87	0.61	19	16	1.3	14.4	92	0.82	0.28	4.5	20	9.9	0.14	0.37	0.07
MRARD10-082	MR1-08-150	Hanging Wall Waste	Volcanic Tuff	NP Depleted [1]	0.12	0.06	1.7	7	0.83	5.8	87	3.8	1.6	7.7	6.8	3.8	0.25	0.11	0.01
MRARD10-120	MR1-08-148	Ore Zone	Iron Formation	Standard	0.46	0.30	9.4	5.6	1.1	4.5	81	0.60	0.12	8.8	46	12	0.28	0.58	0.08
16634	MR1 08 159	Mineralized Waste	Banded Iron Formation	Standard	0.53	0.50	16	6.2	<0.083	6.1	99	0.40	0.037	23	6.3	7.8	0.52 (0.71 **[2]**)	0.091 (0.33 **[2]**)	0.042 (0.57 **[2]**)
16628	MR1 08 154	Mineralized Waste	High Grade Iron Formation	Standard	0.97	0.88	28	13	3.82	9.5	71.3	0.48	0.45	56	16	6.2	0.77 (0.72 **[2]**)	0.32 (0.45 **[2]**)	0.023 (0.09 **[2]**)

* Calculated from sulphide sulphur
**Calculated from minimum between total carbon and carbonate carbon
[1] Post Depletion values used for ABA Data
[2] Percentile of specific lithology
< = indicates that carbonate NP calculated from lab-reported value that is less than the method detection limit

APPENDIX A
Mine Rock Humidity Cell Static Data Plots

Static Data ABA Plots



NP (kg CaCO3/t)
AP (kg CaCO3/t)
1000
100
10
1
0.1
0.01
0.01
0.1
1
10
100
1000
MRARD 10-092
5178
MRARD10-057
MRARD 10-080
MRARD10-123
16628
MRARD10-026
MRARD 10-030
MRARD10-051
MRARD 10-105
5171
5172
MRARD10-082
MRARD 10-055
MRARD 10-074
16634
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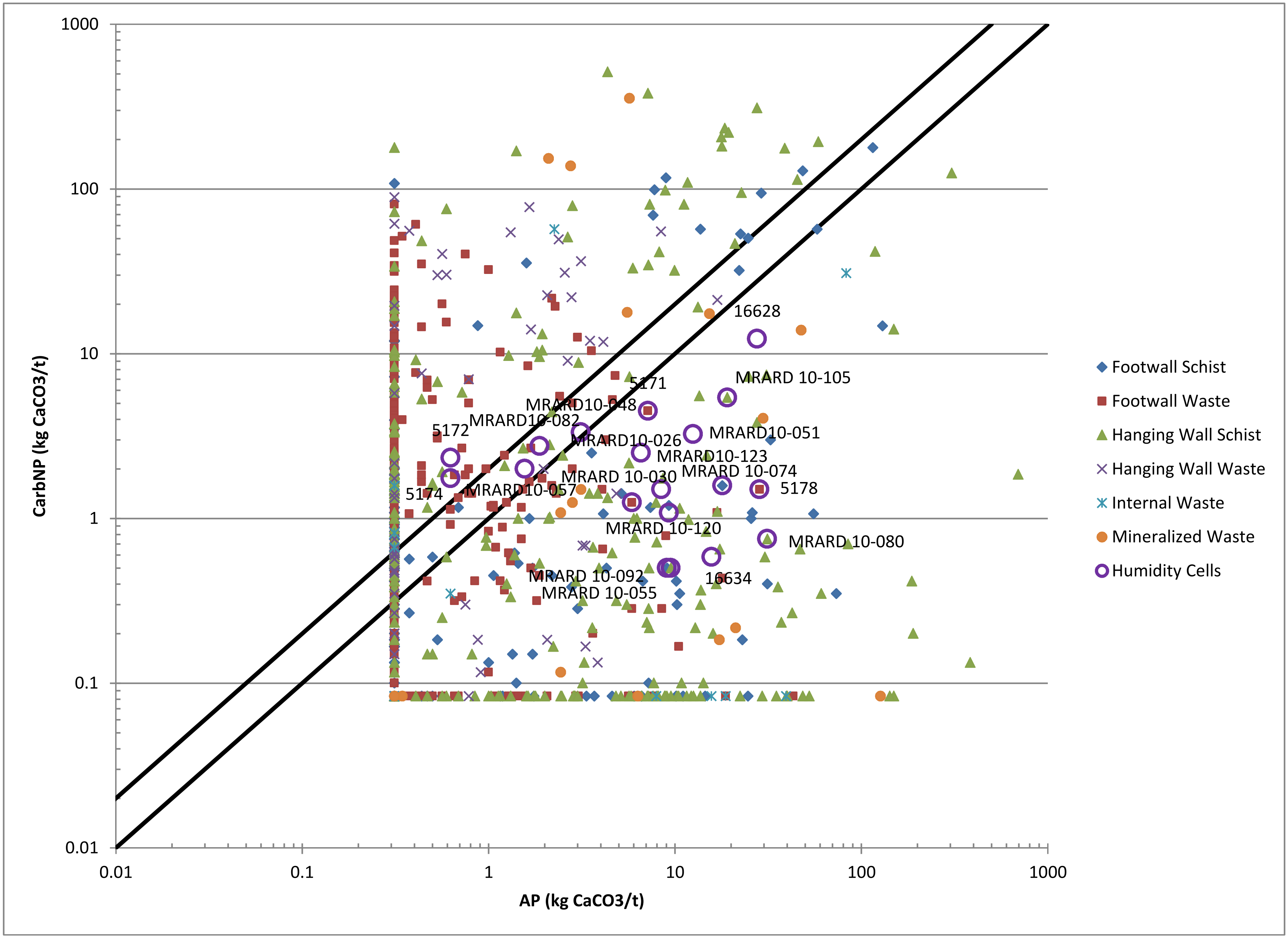
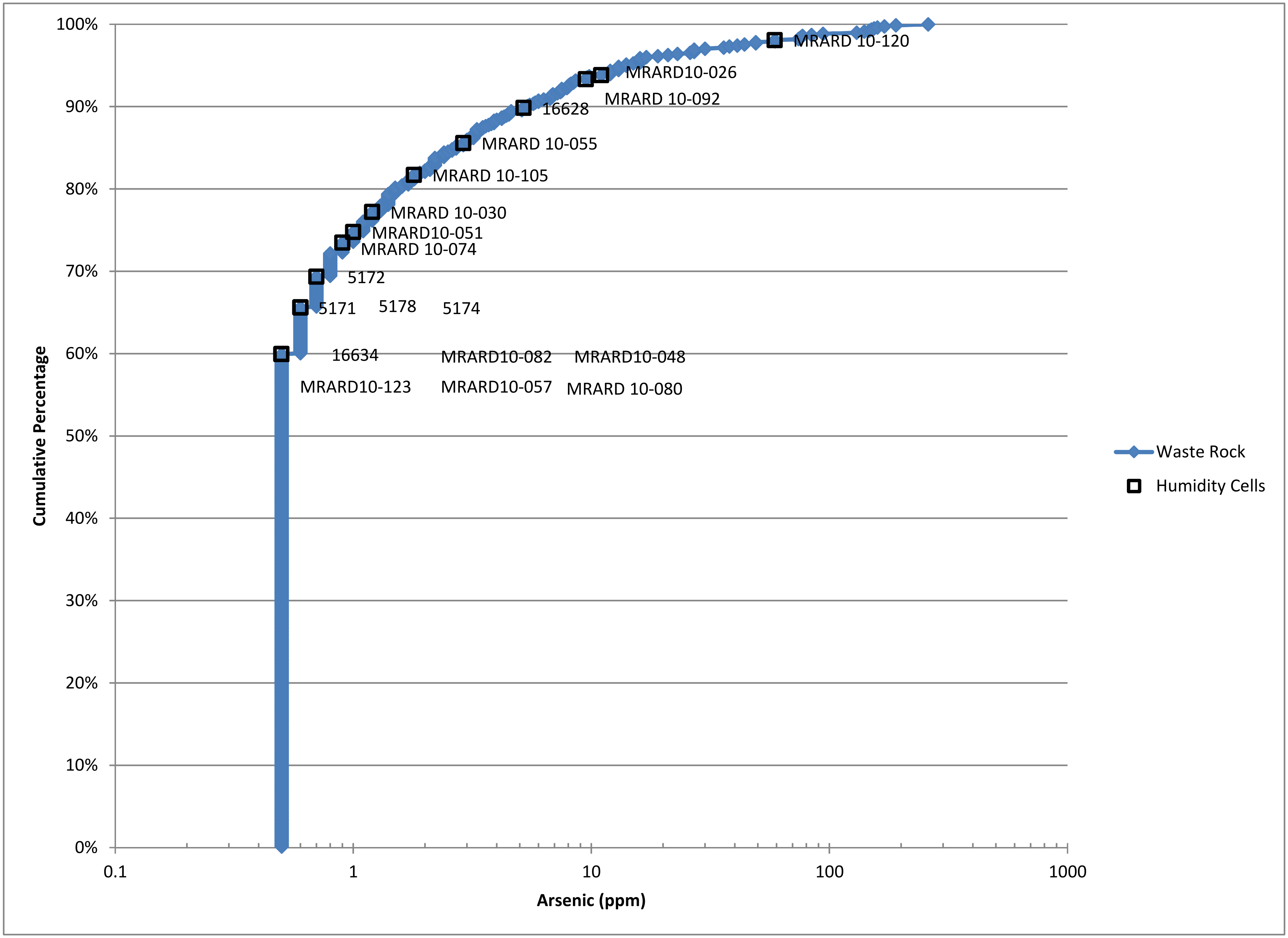
5174
Footwall Schist
Footwall Waste
Hanging Wall Schist
Hanging Wall Waste
Internal Waste
Mineralized Waste
Humidity Cells



CarbNP (kg CaCO3/t)
AP (kg CaCO3/t)
1000
100
10
1
0.1
0.01
0.01
0.1
1
10
100
1000
16628
MRARD 10-105
5171
MRARD10-048
MRARD10-082
5172
MRARD10-026
MRARD10-051
MRARD10-123
MRARD 10-030
MRARD 10-074
5174
MRARD10-057
5178
MRARD 10-120
MRARD 10-080
MRARD 10-092
16634
MRARD 10-055
Footwall Schist
Footwall Waste
Hanging Wall Schist
Hanging Wall Waste
Internal Waste
Mineralized Waste
Humidity Cells

Static Data Cumulative Frequency Plots



100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percentage
0.1
1
10
100
1000
Arsenic (ppm)
MRARD 10-120
MRARD10-026
MRARD 10-092
16628
MRARD 10-055
MRARD 10-105
MRARD 10-030
MRARD10-051
MRARD 10-074
5172
5171
5178
5174
16634
MRARD10-082
MRARD10-048
MRARD10-123
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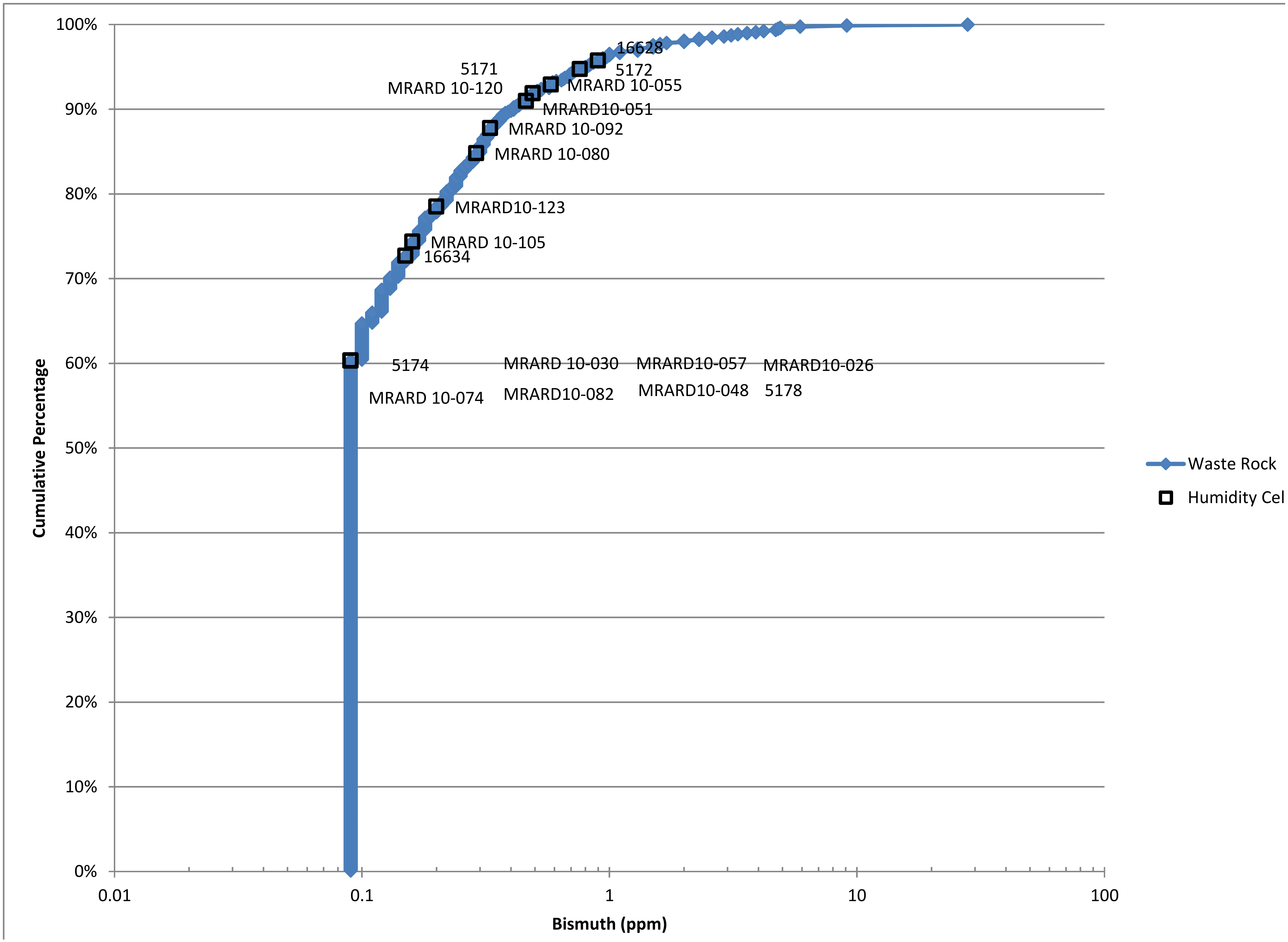
MRARD 10-080
Waste Rock
Humidity Cells



100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percentage
0.01
0.1
1
10
100
Bismuth (ppm)
16628
5171
5172
MRARD 10-120
MRARD 10-055
MRARD10-051
MRARD 10-092
MRARD 10-080
MRARD10-123
MRARD 10-105
16634
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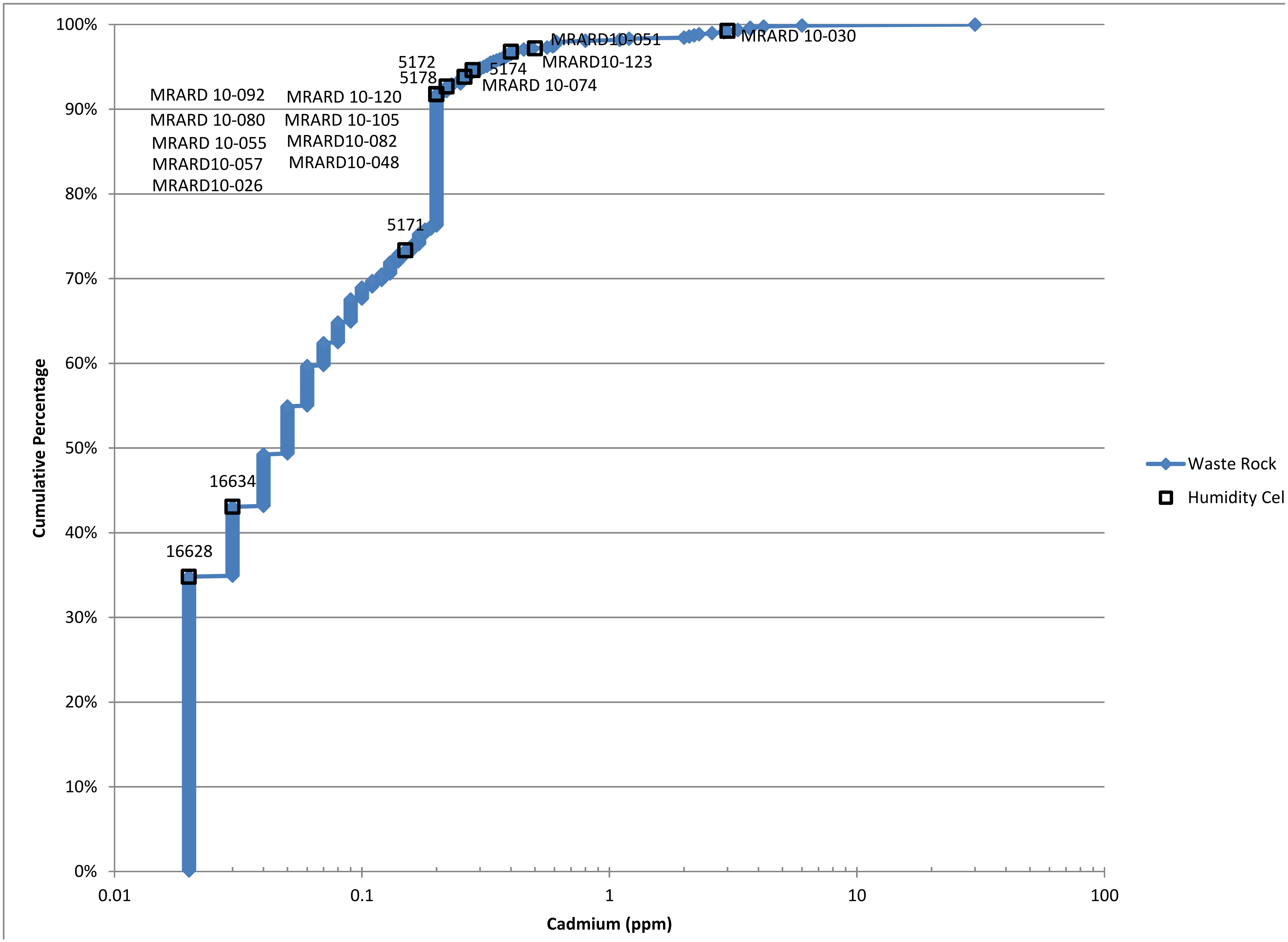
5178
Waste Rock
Humidity Cel



amec foster wheeler
Cumulative Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.01
0.1
1
10
100
Cadmium (ppm)
MRARD 10-092
MRARD 10-080
MRARD 10-055
MRARD10-057
MRARD10-026
MRARD 10-120
MRARD 10-105
MRARD10-082
MRARD10-048
5172
5178
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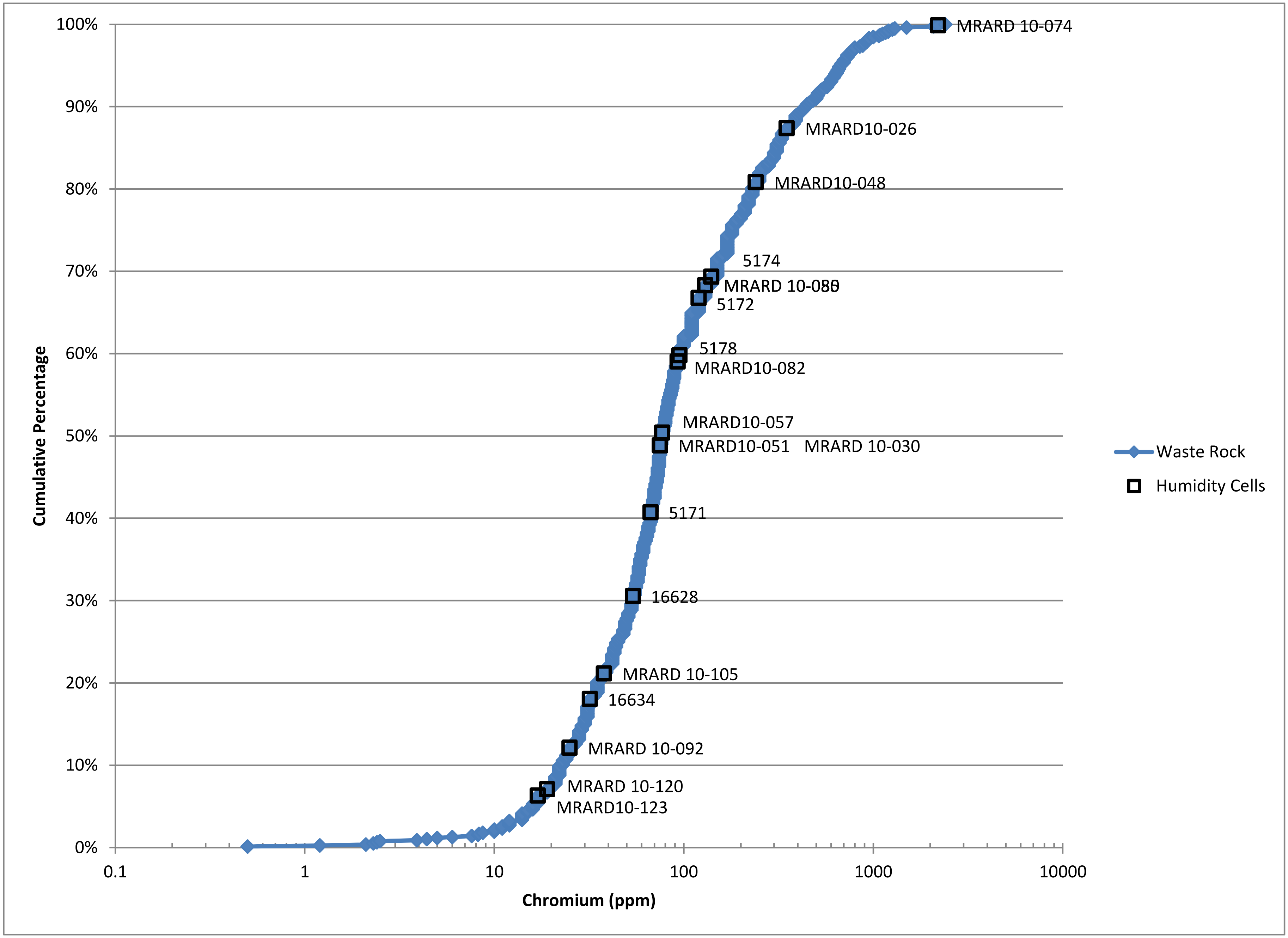
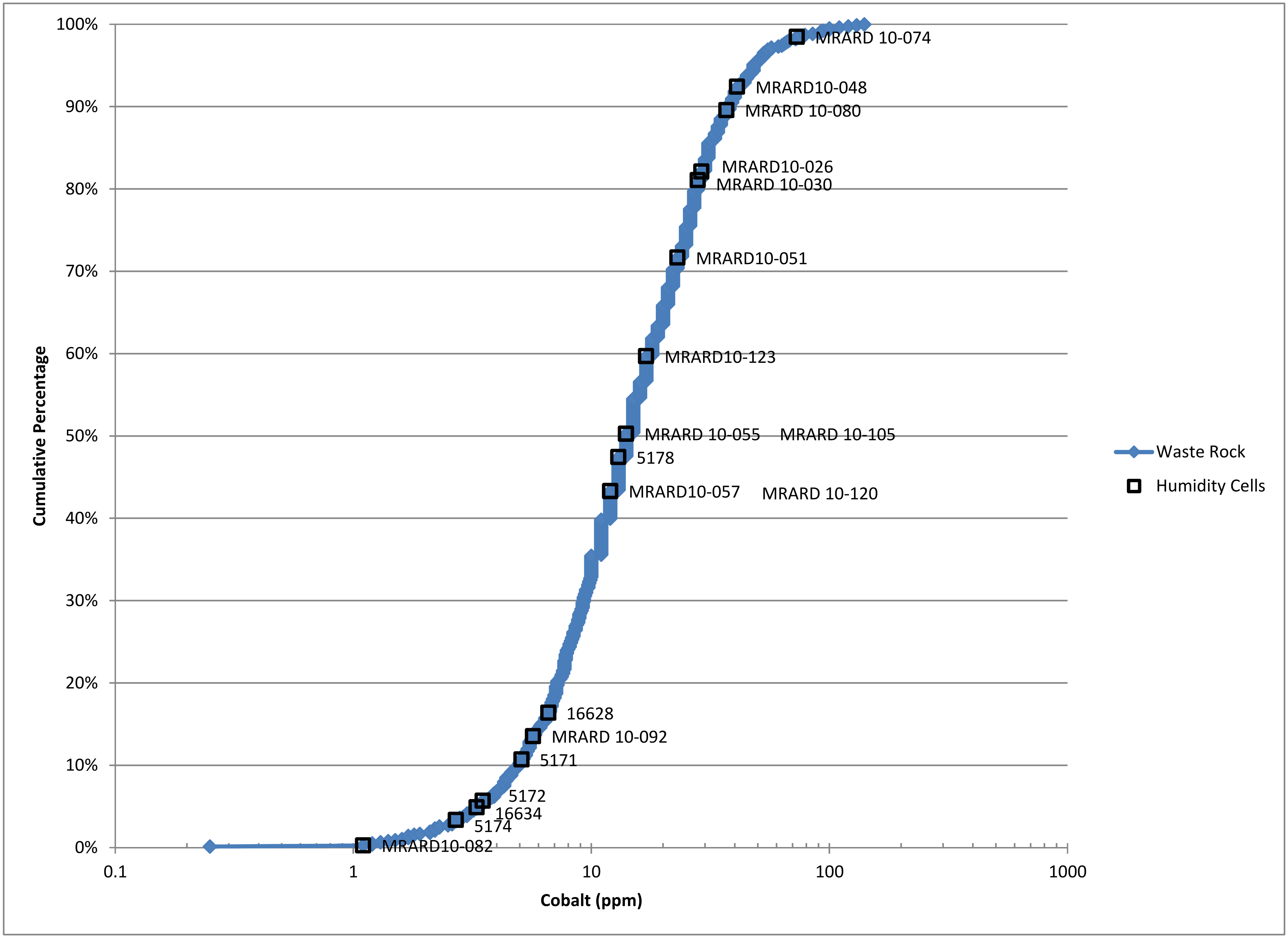
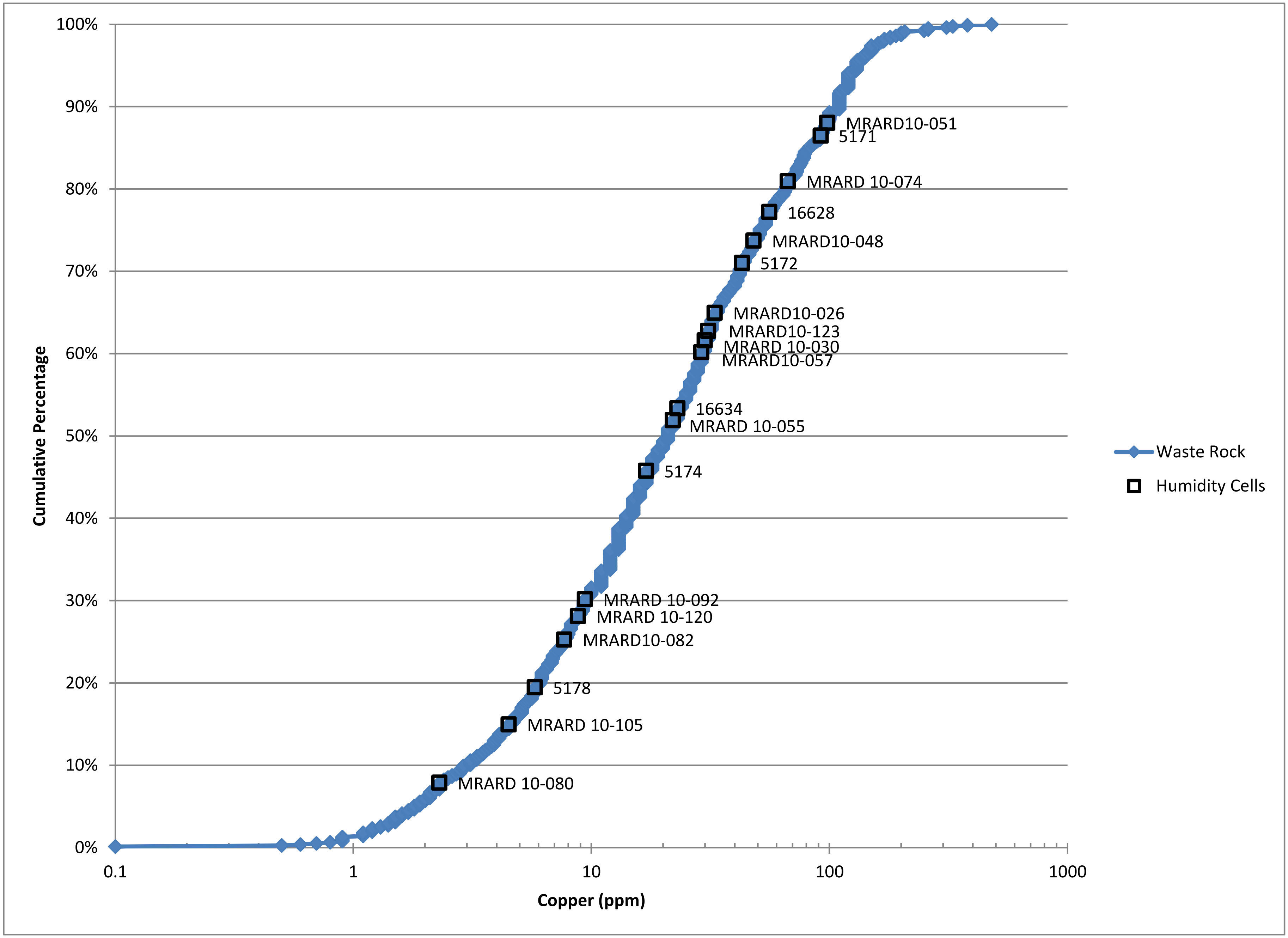
MRARD 10-074
MRARD10-123
MRARD10-051
MRARD 10-030
5171
16634
16628
Waste Rock
Humidity Cel

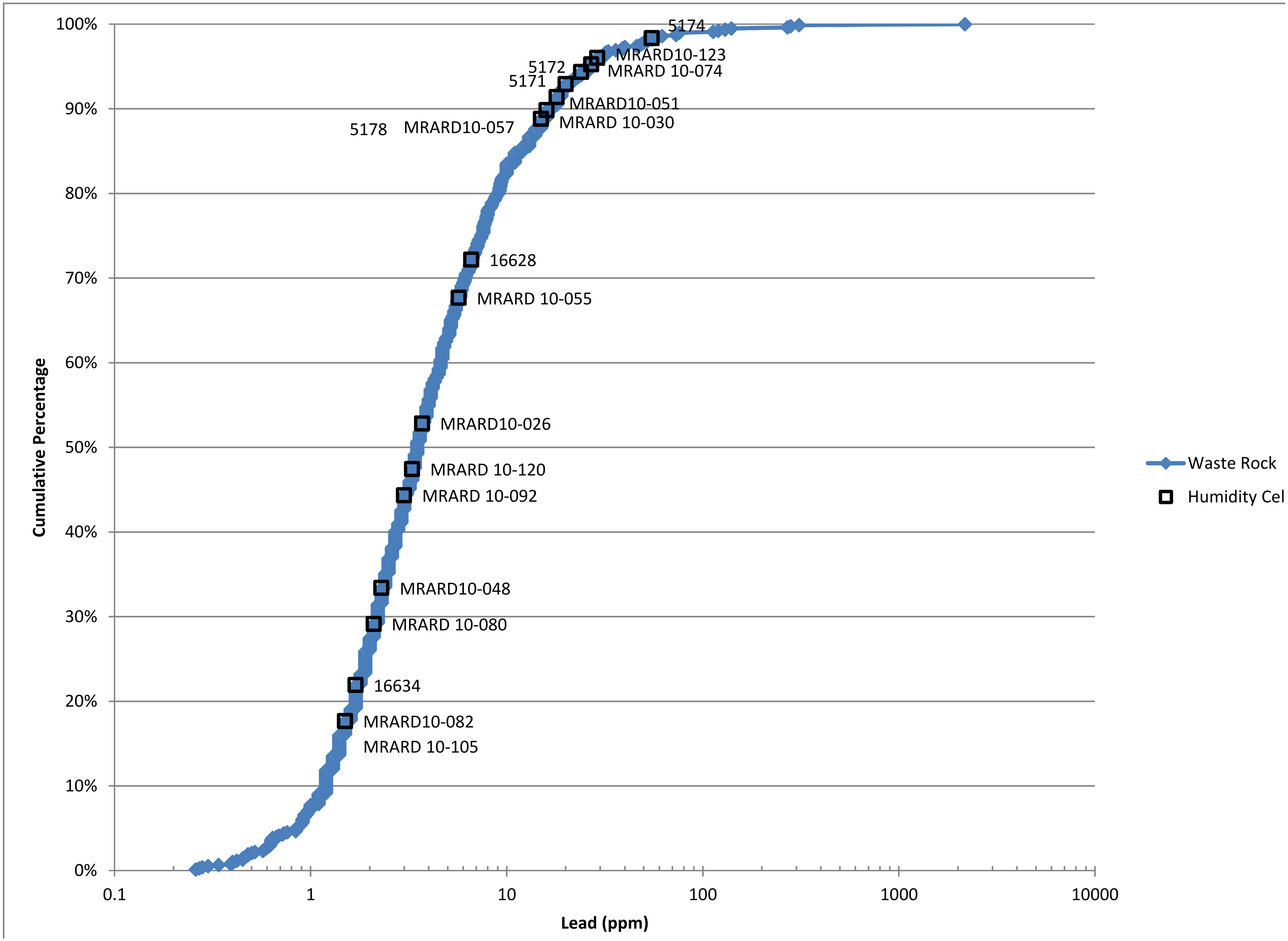


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percentage
0.1
1
10
100
1000
10000
Chromium (ppm)
MRARD 10-074
MRARD10-026
MRARD10-048
5174
MRARD 10-080
5172
5178
MRARD10-082
MRARD10-057
MRARD10-051
MRARD 10-030
5171
16628
MRARD 10-105
16634
MRARD 10-092
MRARD 10-120
MRARD10-123
Waste Rock
Humidity Cells

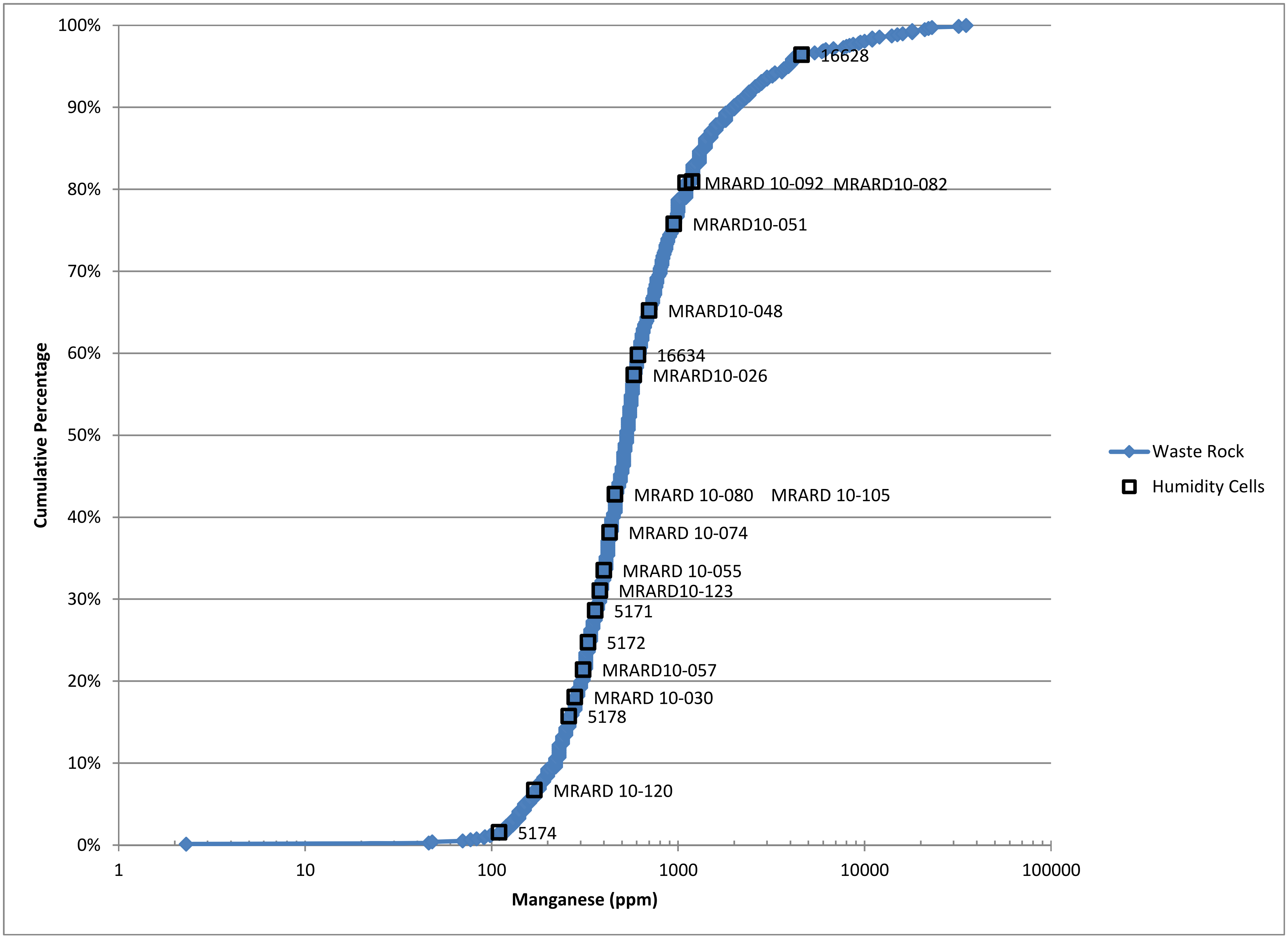


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percentage
0.1
1
10
100
1000
Cobalt (ppm)
MRARD 10-074
MRARD10-048
MRARD 10-080
MRARD10-026
MRARD 10-030
MRARD10-051
MRARD10-123
MRARD 10-055
MRARD 10-105
5178
MRARD10-057
MRARD 10-120
16628
MRARD 10-092
5171
5172
16634
5174
MRARD10-082
Waste Rock
Humidity Cells

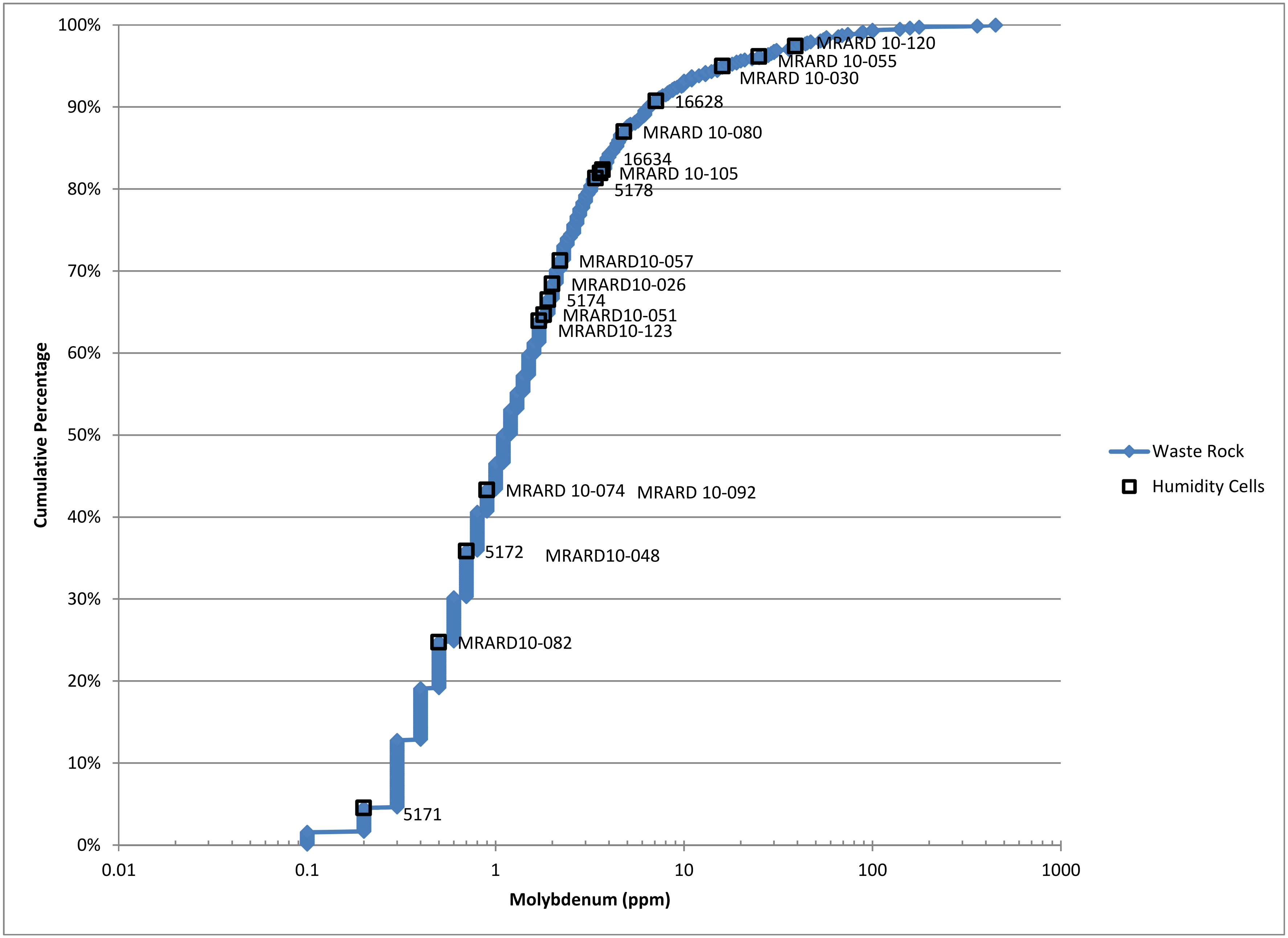

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percentage
0.1
1
10
100
1000
Copper (ppm)
MRARD10-051
5171
MRARD 10-074
16628
MRARD10-048
5172
MRARD10-026
MRARD10-123
MRARD 10-030
MRARD10-057
16634
MRARD 10-055
5174
MRARD 10-092
MRARD 10-120
MRARD10-082
5178
MRARD 10-105
MRARD 10-080
Waste Rock
Humidity Cells



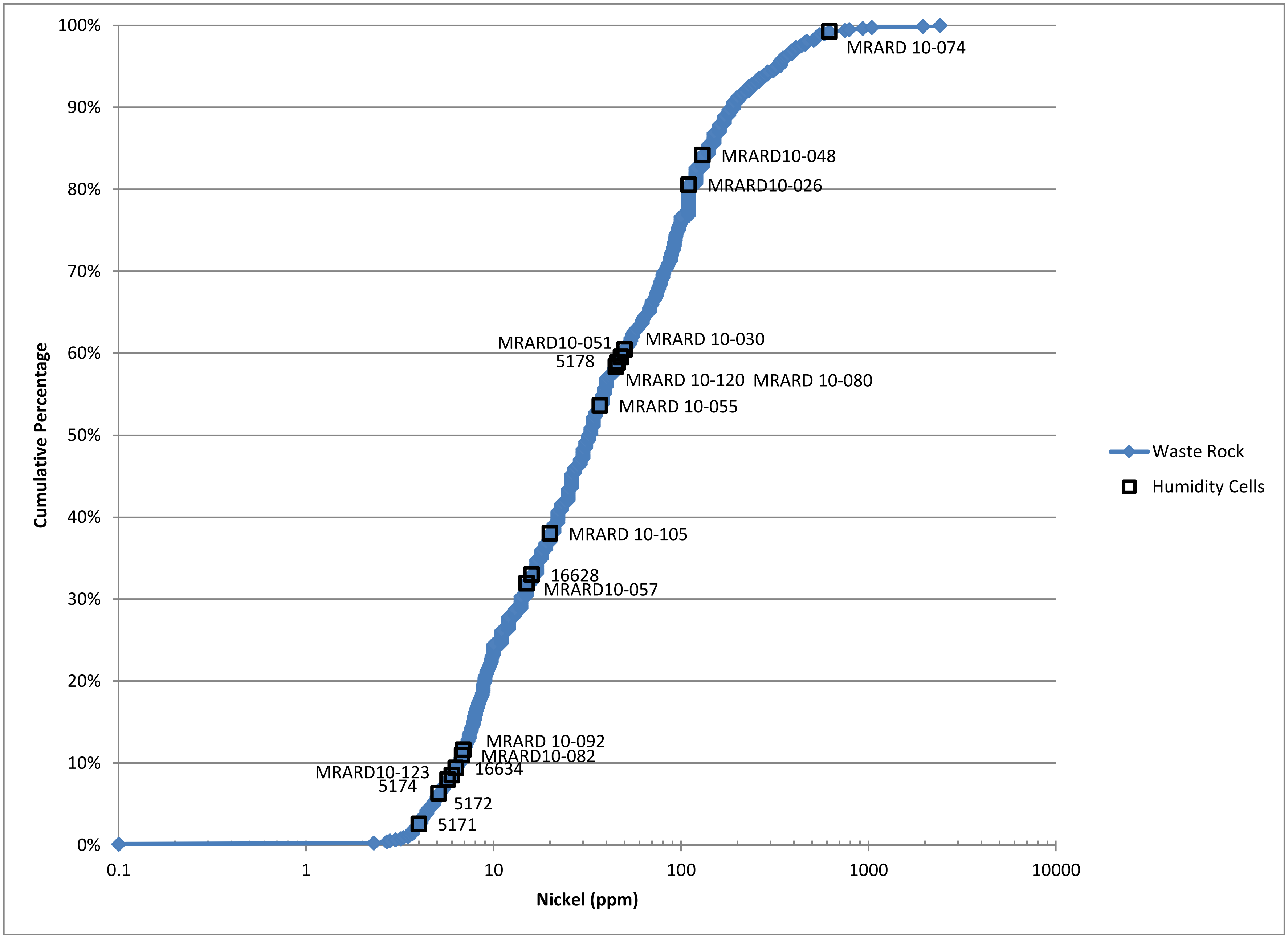
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percentage
0.1
1
10
100
1000
10000
Lead (ppm)
5174
MRARD10-123
MRARD 10-074
5172
5171
MRARD10-051
MRARD 10-030
5178
MRARD10-057
16628
MRARD 10-055
MRARD10-026
MRARD 10-120
MRARD 10-092
MRARD10-048
MRARD 10-080
16634
MRARD10-082
MRARD 10-105
Waste Rock
Humidity Cel



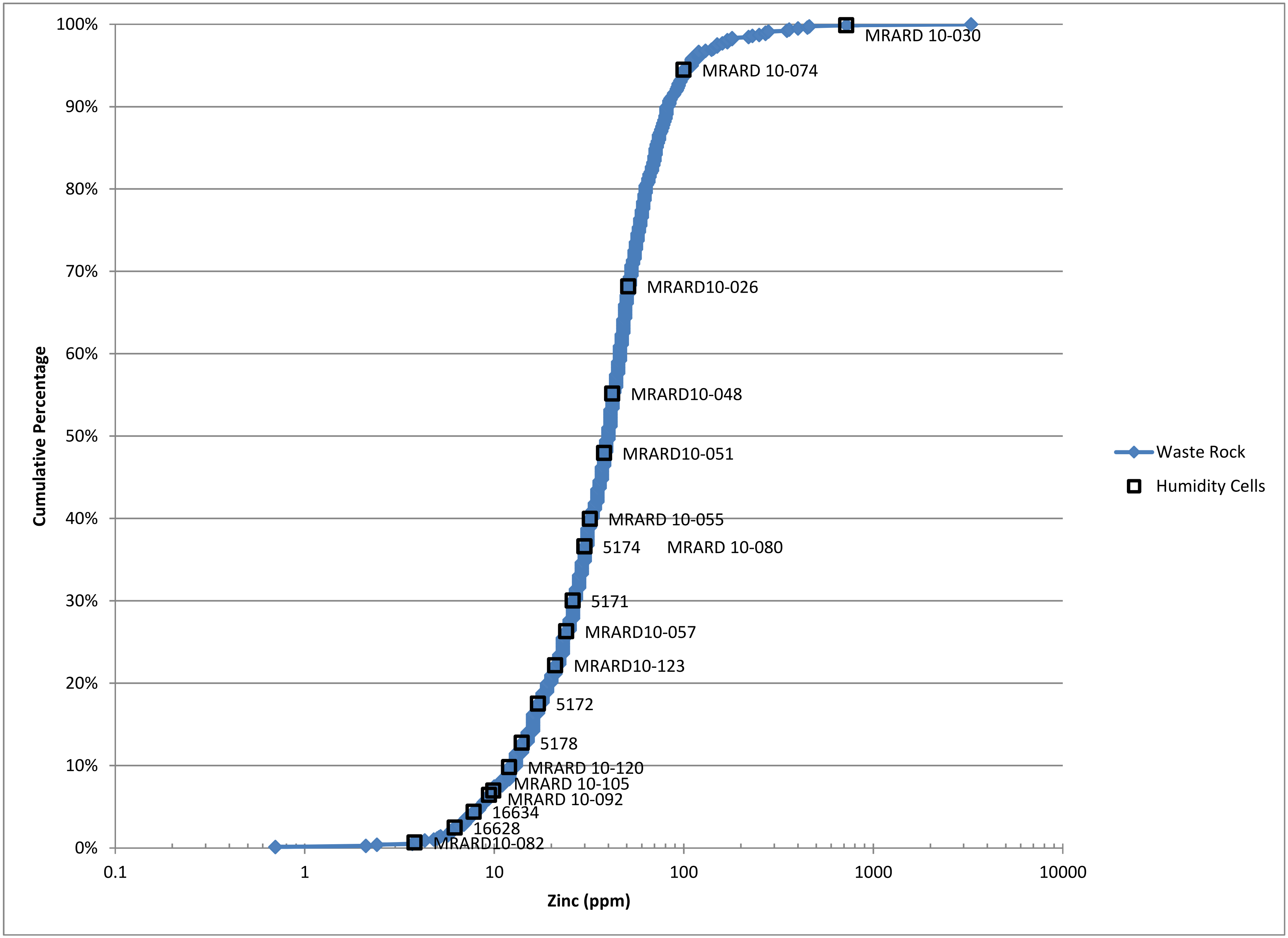
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percentage
1
10
100
1000
10000
100000
Manganese (ppm)
16628
MRARD 10-092
MRARD10-082
MRARD10-051
MRARD10-048
16634
MRARD10-026
MRARD 10-080
MRARD 10-105
MRARD 10-074
MRARD 10-055
MRARD10-123
5171
5172
MRARD10-057
MRARD 10-030
5178
MRARD 10-120
5174
Waste Rock
Humidity Cells



100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percentage
0.01
0.1
1
10
100
1000
Molybdenum (ppm)
MRARD 10-120
MRARD 10-055
MRARD 10-030
16628
MRARD 10-080
16634
MRARD 10-105
5178
MRARD10-057
MRARD10-026
5174
MRARD10-051
MRARD10-123
MRARD 10-074
MRARD 10-092
5172
MRARD10-048
MRARD10-082
5171
Waste Rock
Humidity Cells



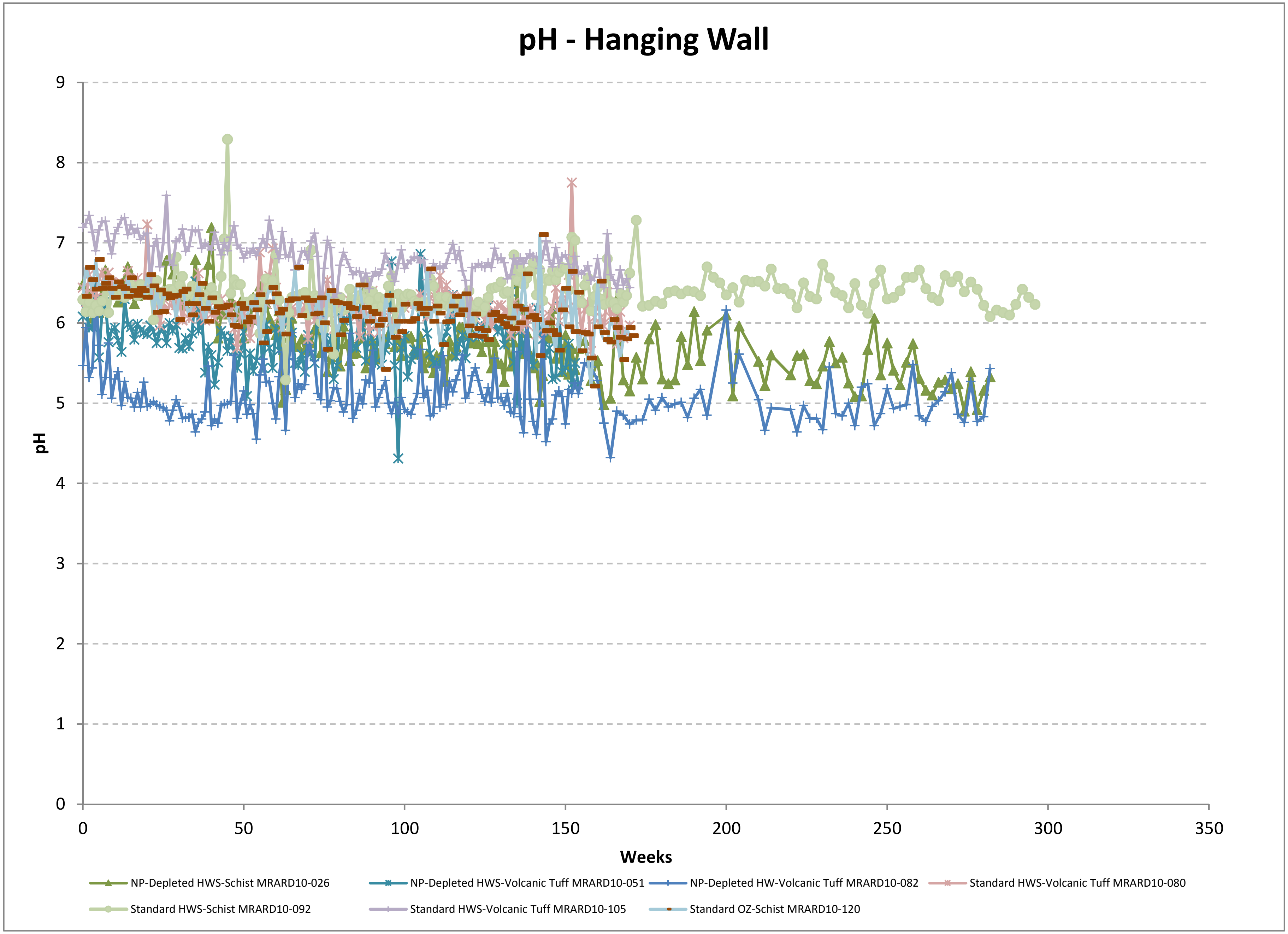
Cumulative Percentage
Nickel (ppm)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
10000
MRARD 10-074
MRARD10-048
MRARD10-026
MRARD10-051
MRARD 10-030
5178
MRARD 10-120
MRARD 10-080
MRARD 10-055
MRARD 10-105
16628
MRARD10-057
MRARD 10-092
MRARD10-082
16634
MRARD10-123
5174
5172
5171
Waste Rock
Humidity Cells

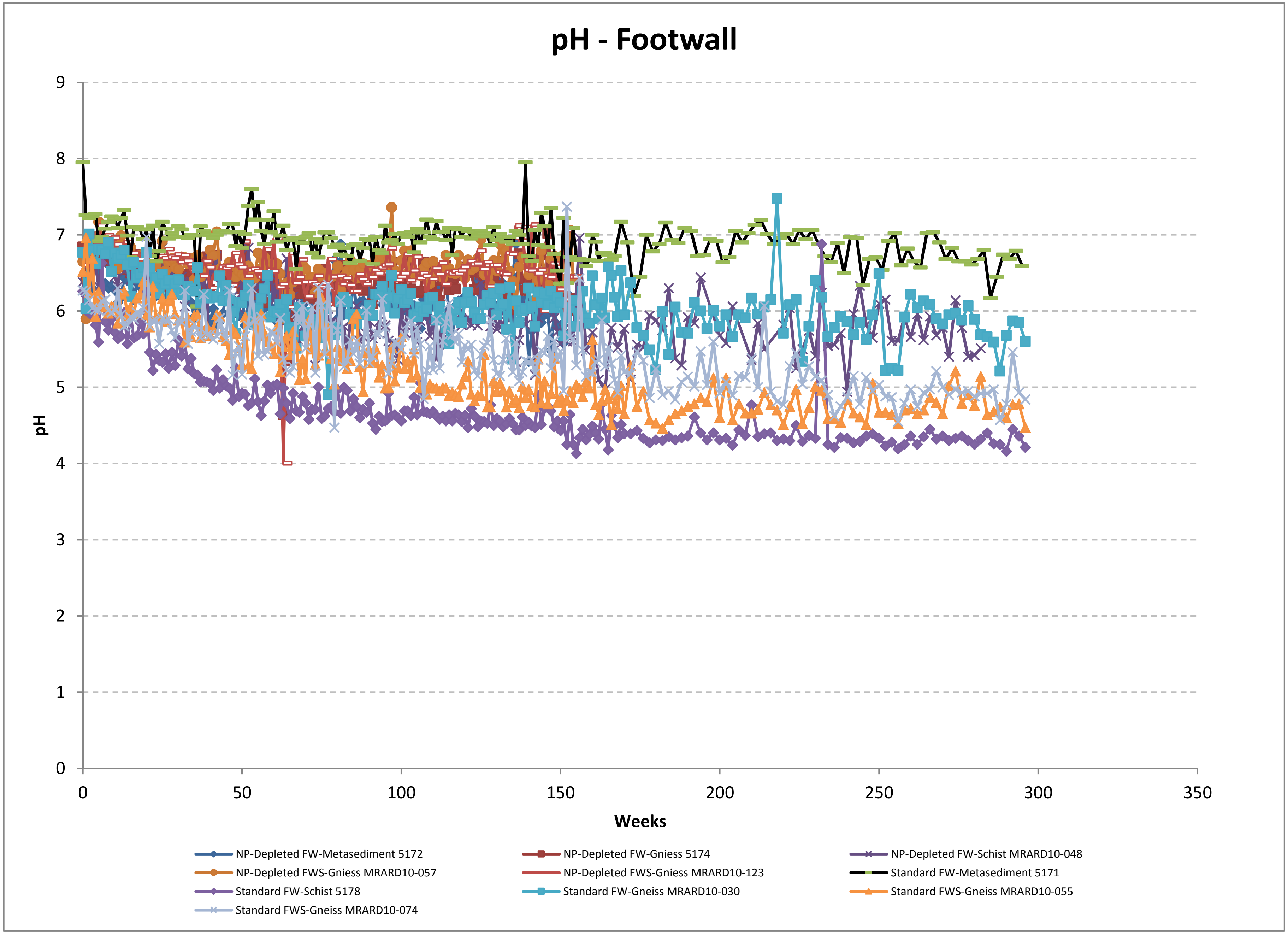


Cumulative Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
10000
Zinc (ppm)
MRARD 10-030
MRARD 10-074
MRARD10-026
MRARD10-048
MRARD10-051
MRARD 10-055
5174
MRARD 10-080
5171
MRARD10-057
MRARD10-123
5172
5178
MRARD 10-120
MRARD 10-105
MRARD 10-092
16634
16628
MRARD10-082
Waste Rock
Humidity Cells

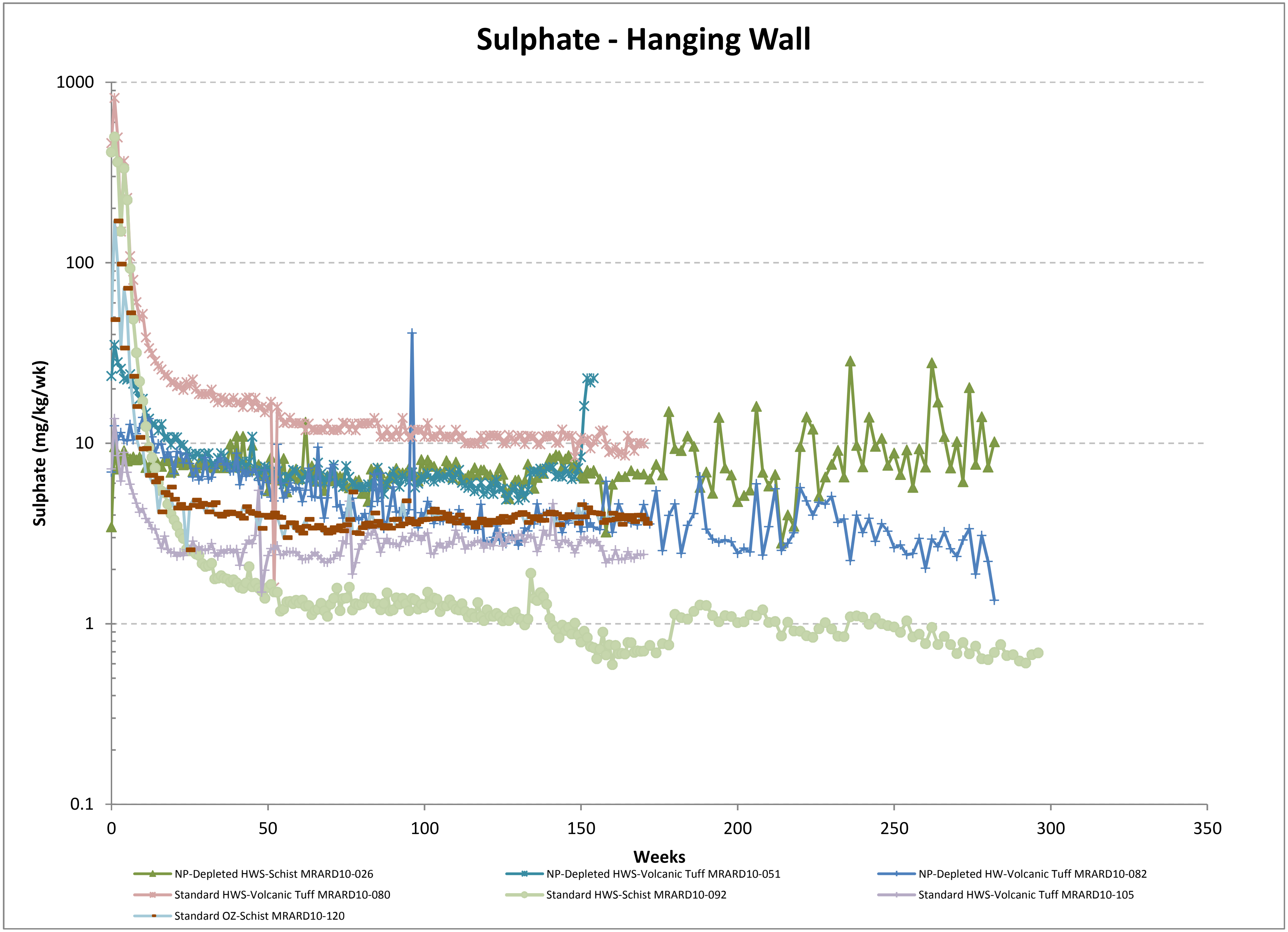
APPENDIX B
Mine Rock Humidity Cell Results

Hanging Wall and Footwall Humidity Cell Plots

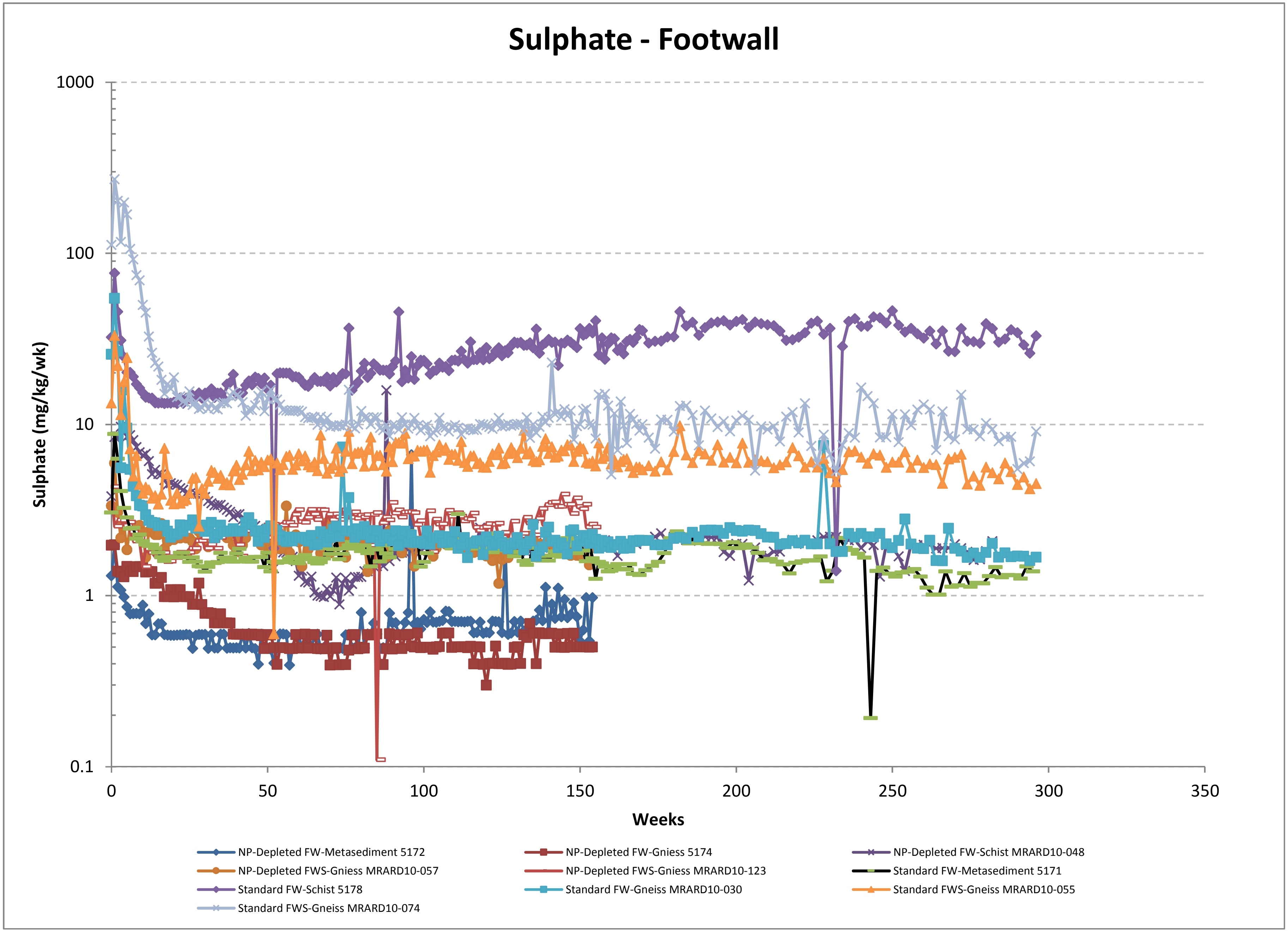

pH - Hanging Wall
pH
Weeks
0
1
2
3
4
5
6
7
8
9
0
50
100
150
200
250
300
350
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



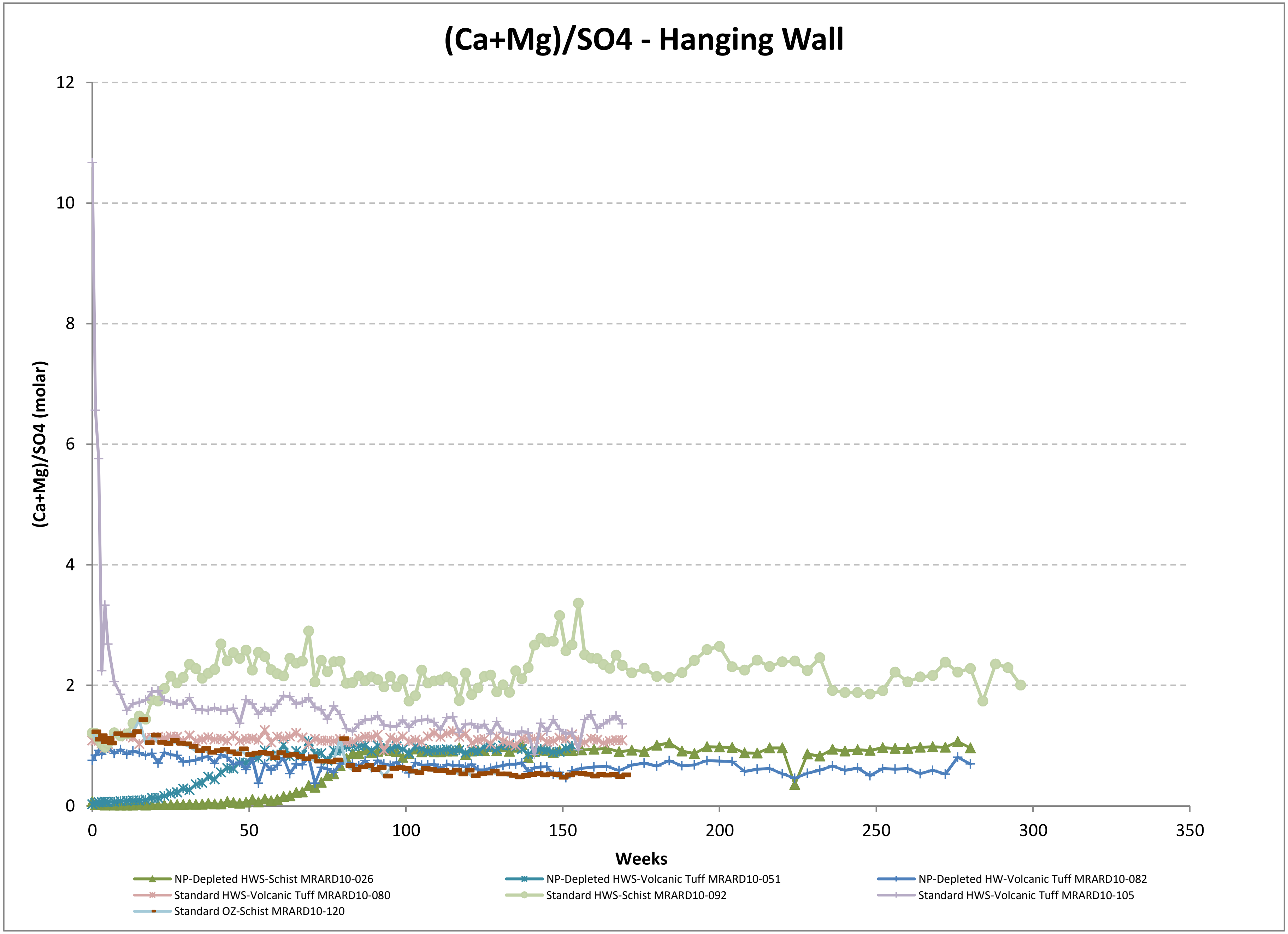
pH - Footwall
pH
Weeks
0
1
2
3
4
5
6
7
8
9
0
50
100
150
200
250
300
350
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



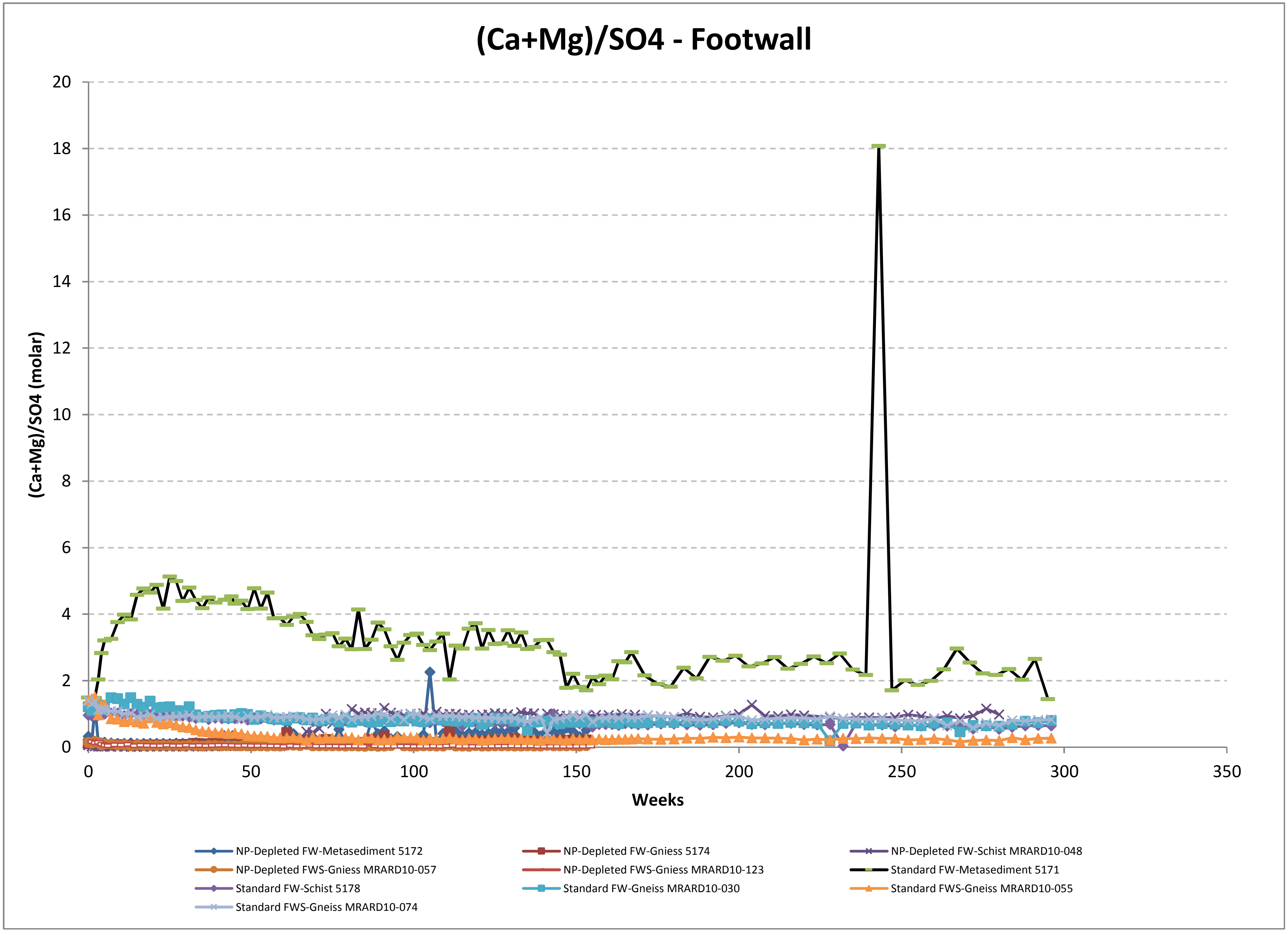
Sulphate - Hanging Wall
Sulphate (mg/kg/wk)
1000
100
10
1
0.1
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



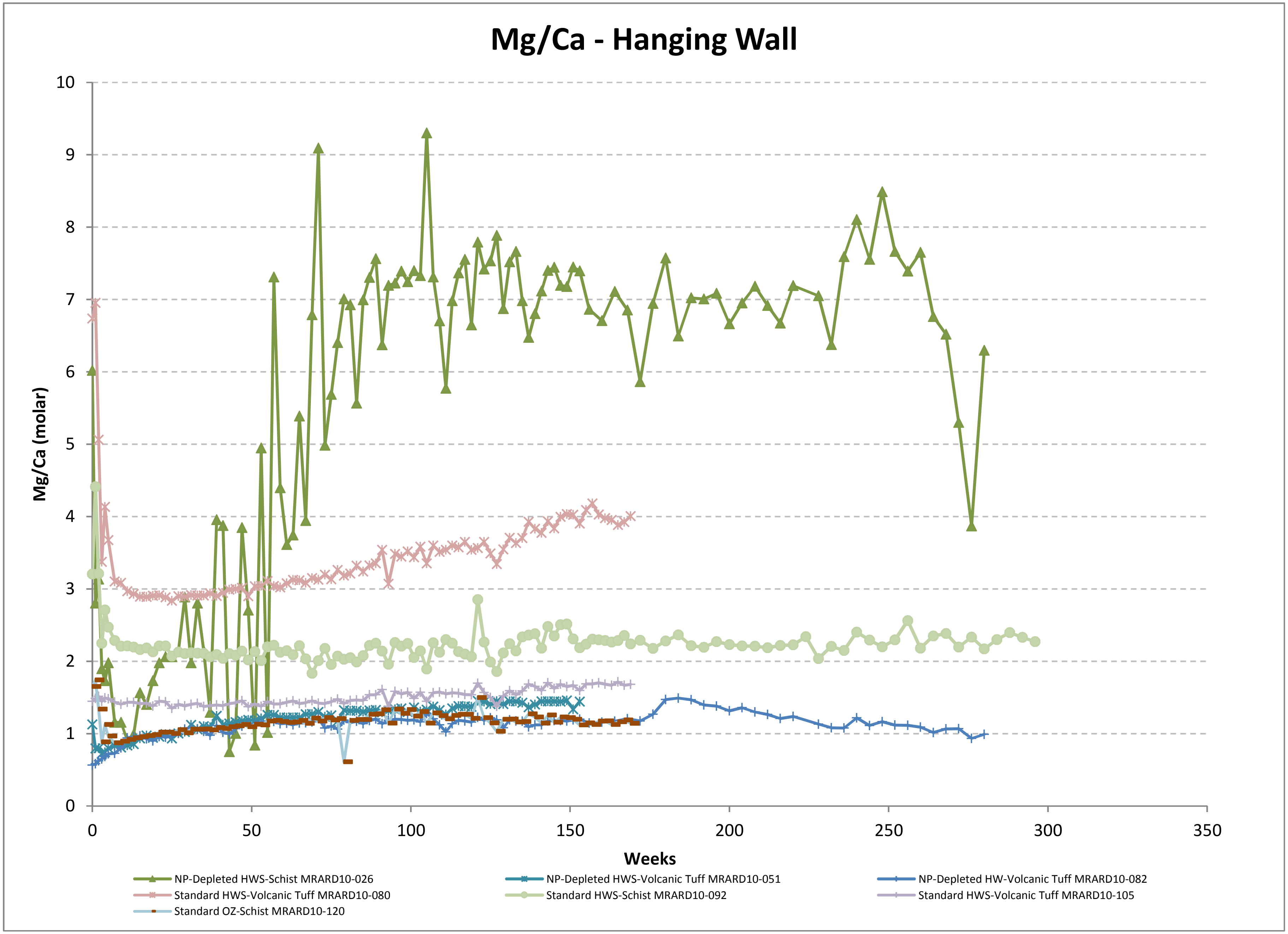
Sulphate - Footwall
Sulphate (mg/kg/wk)
1000
100
10
1
0.1
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



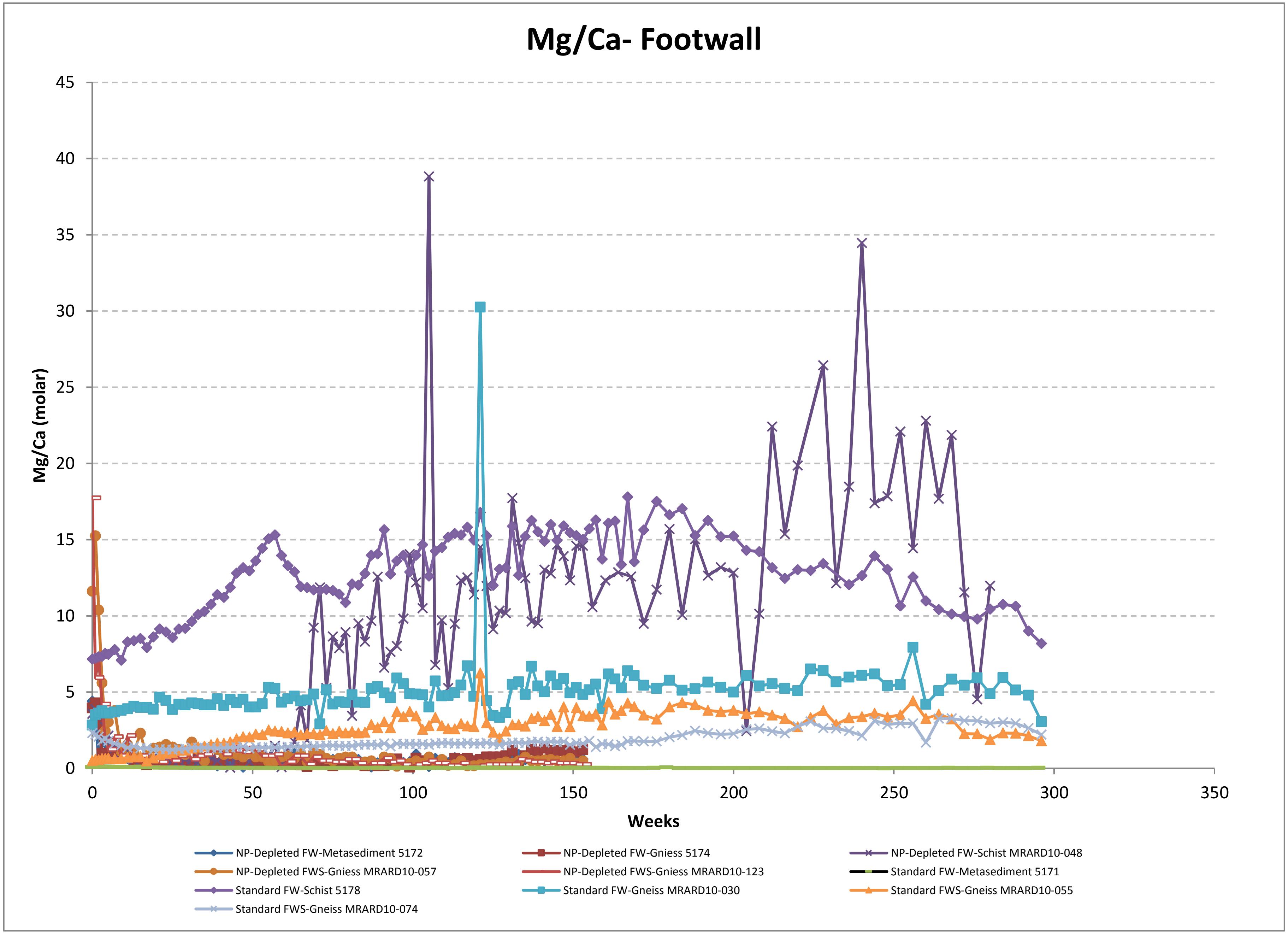
(Ca+Mg)/SO4 - Hanging Wall
(Ca+Mg)/SO4 (molar)
Weeks
0
2
4
6
8
10
12
0
50
100
150
200
250
300
350
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

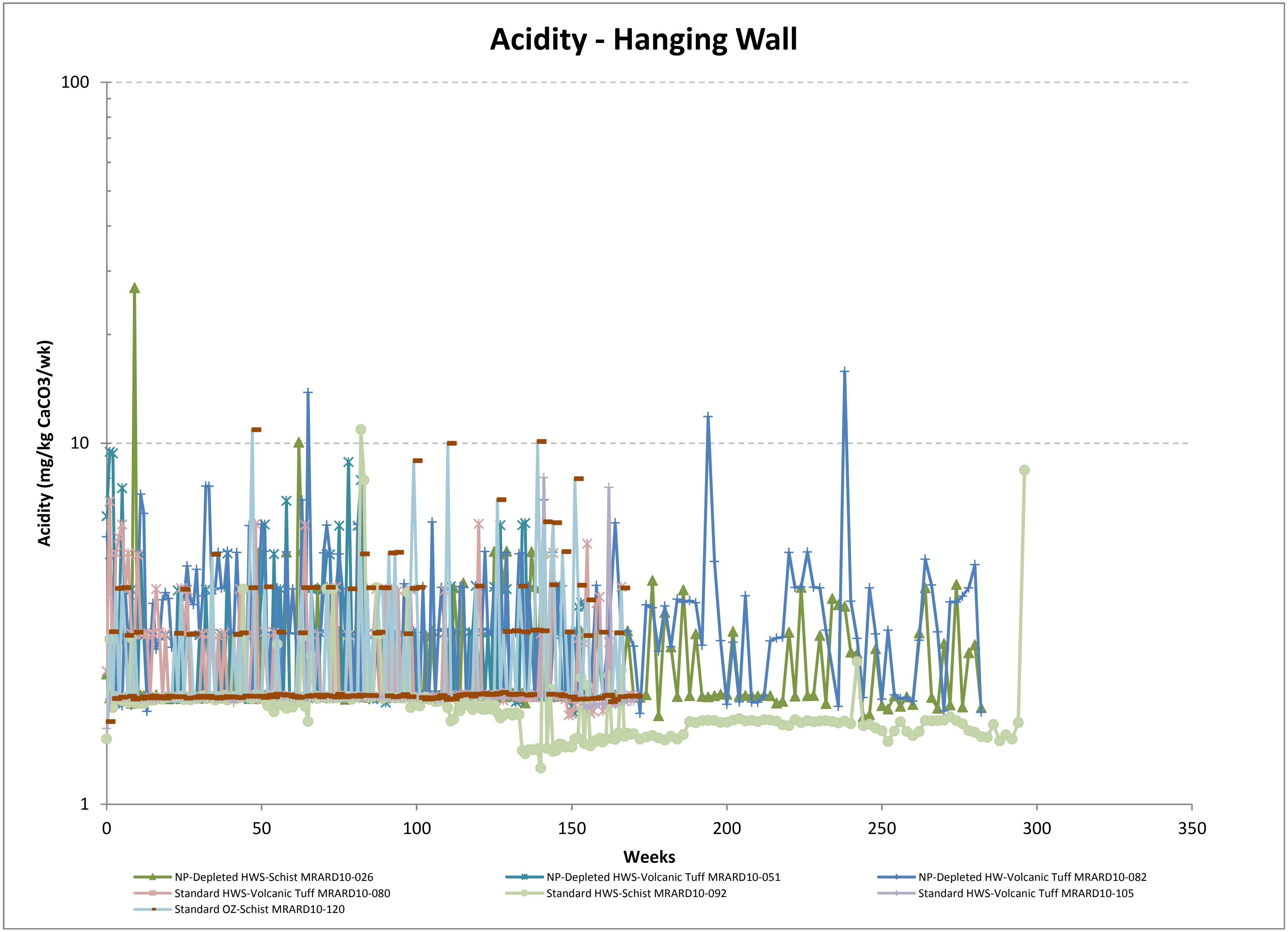


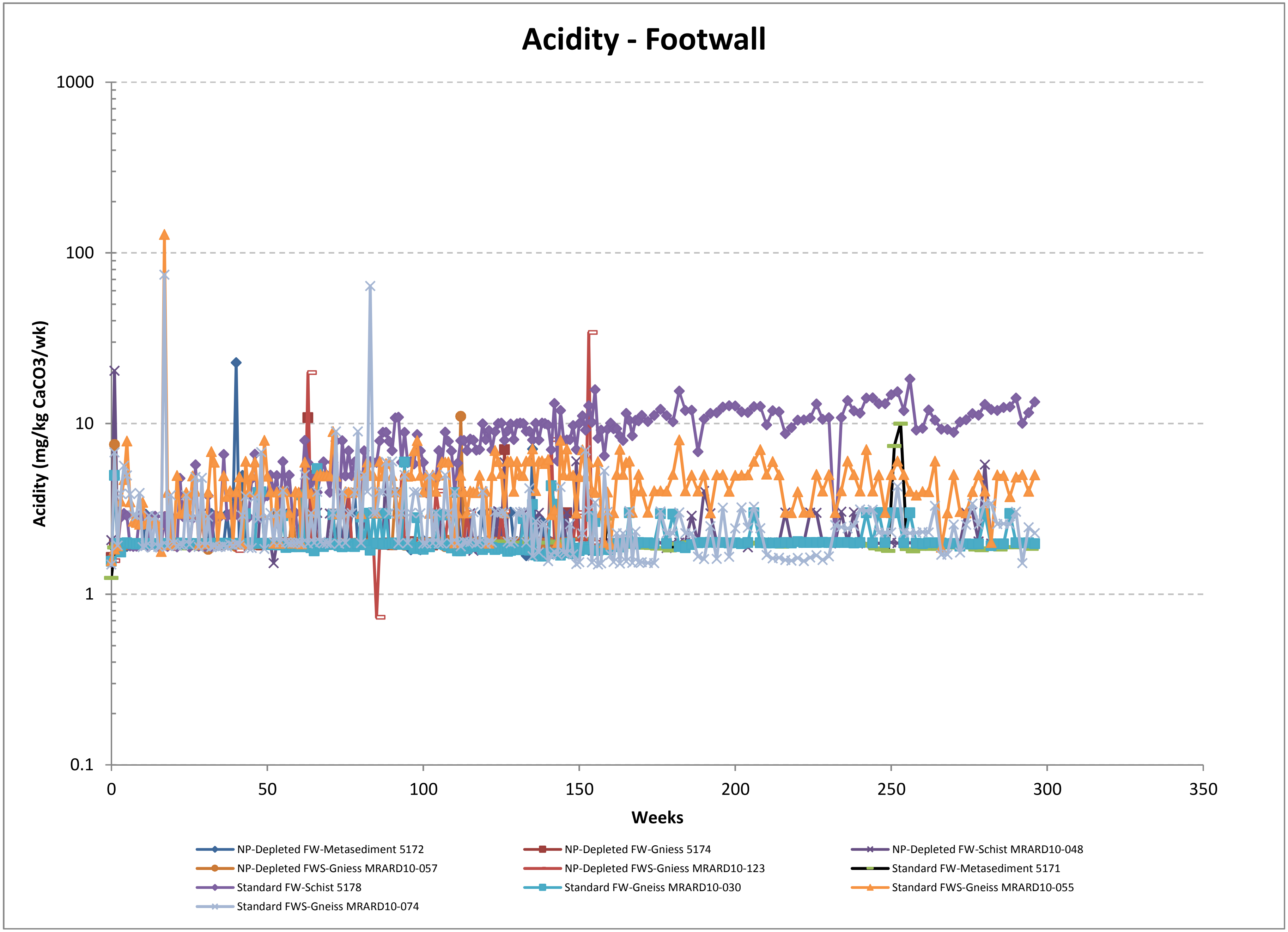
(Ca+Mg)/SO4 - Footwall
(Ca+Mg)/SO4 (molar)
Weeks
0
2
4
6
8
10
12
14
16
18
20
0
50
100
150
200
250
300
350
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



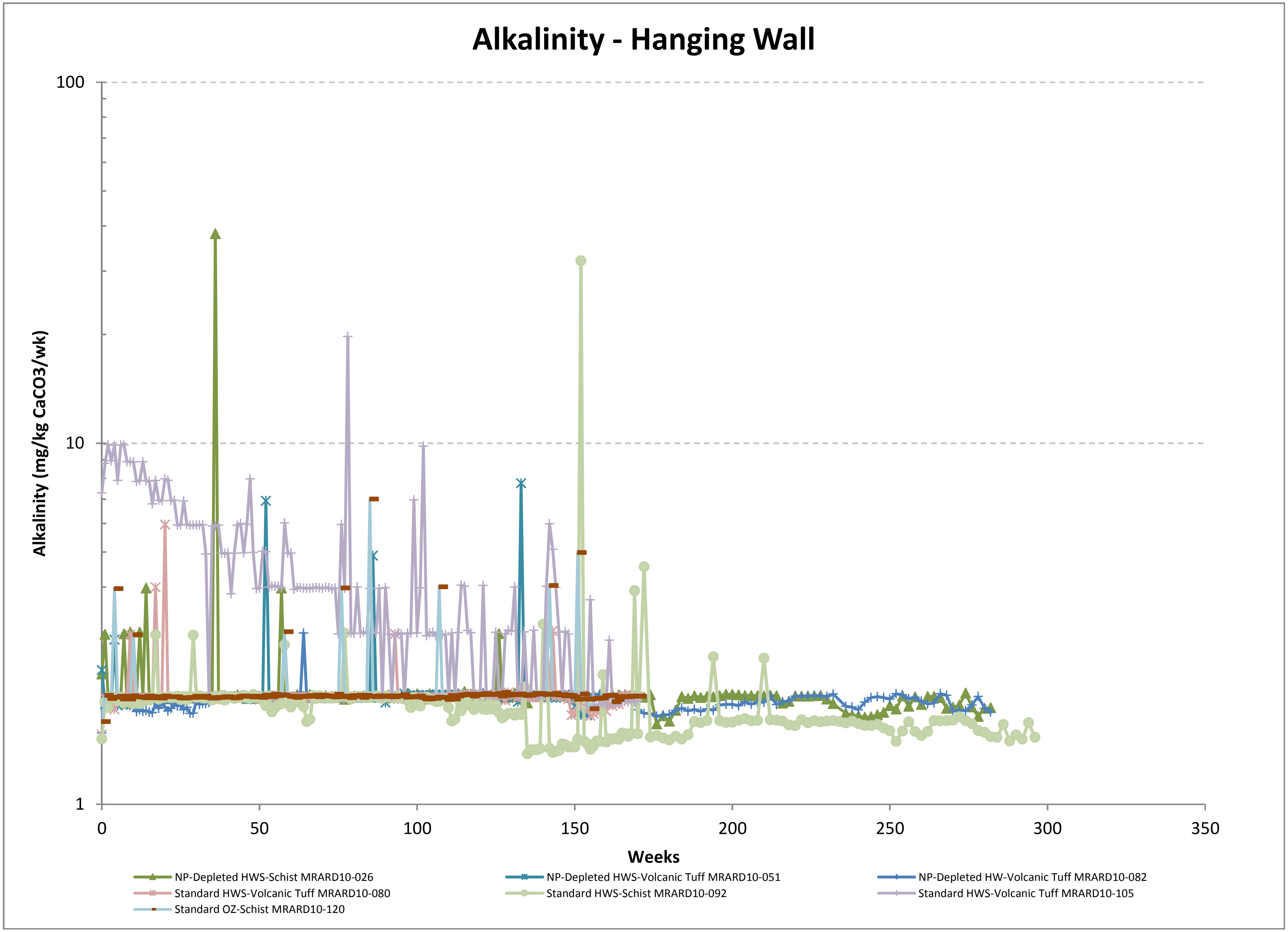
Mg/Ca - Hanging Wall
Mg/Ca (molar)
0
1
2
3
4
5
6
7
8
9
10
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120


Mg/Ca- Footwall
Mg/Ca (molar)
Weeks
0
5
10
15
20
25
30
35
40
45
0
50
100
150
200
250
300
350
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

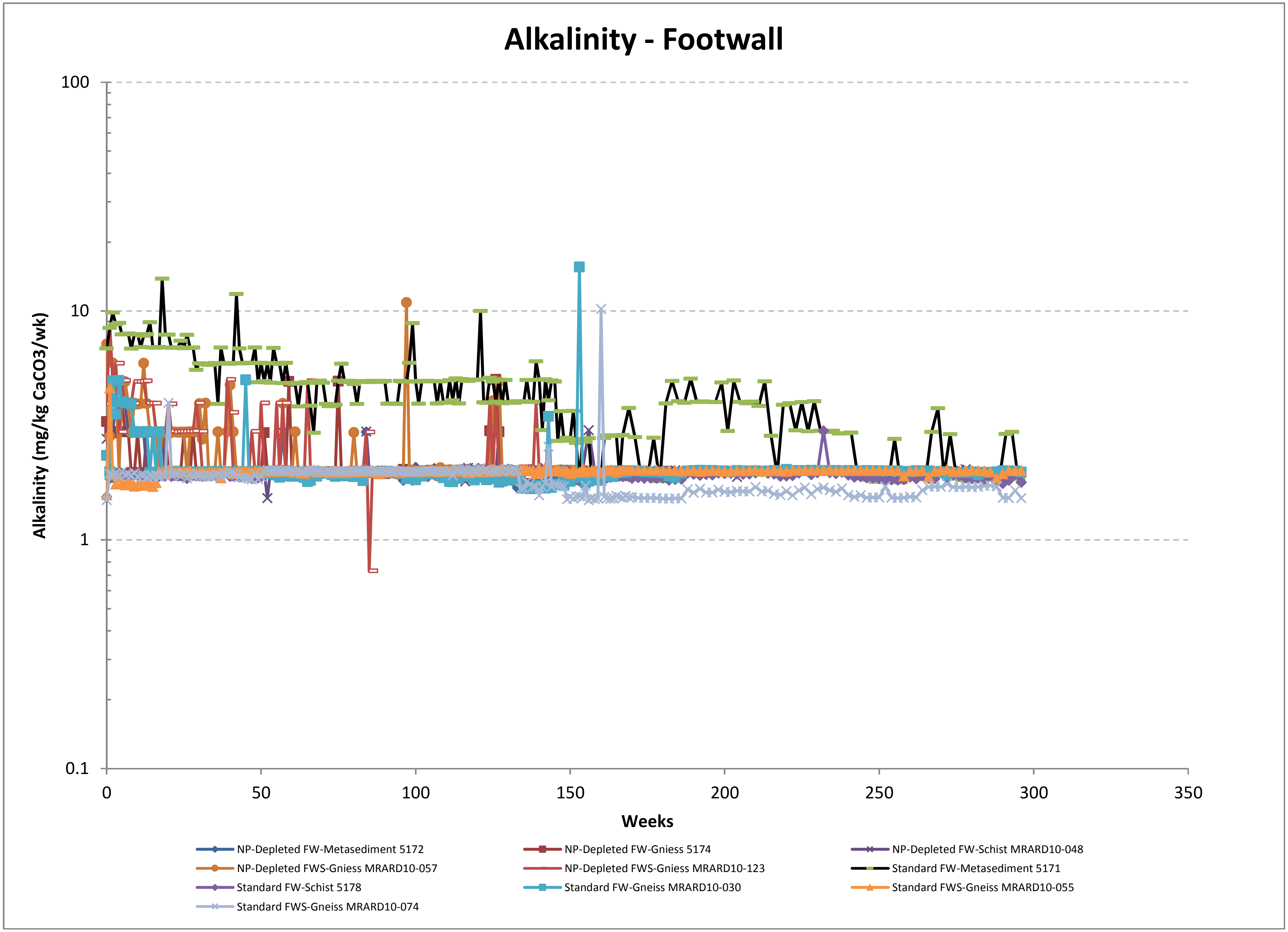

Acidity - Hanging Wall
100
10
1
Acidity (mg/kg CaCO3/wk)
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

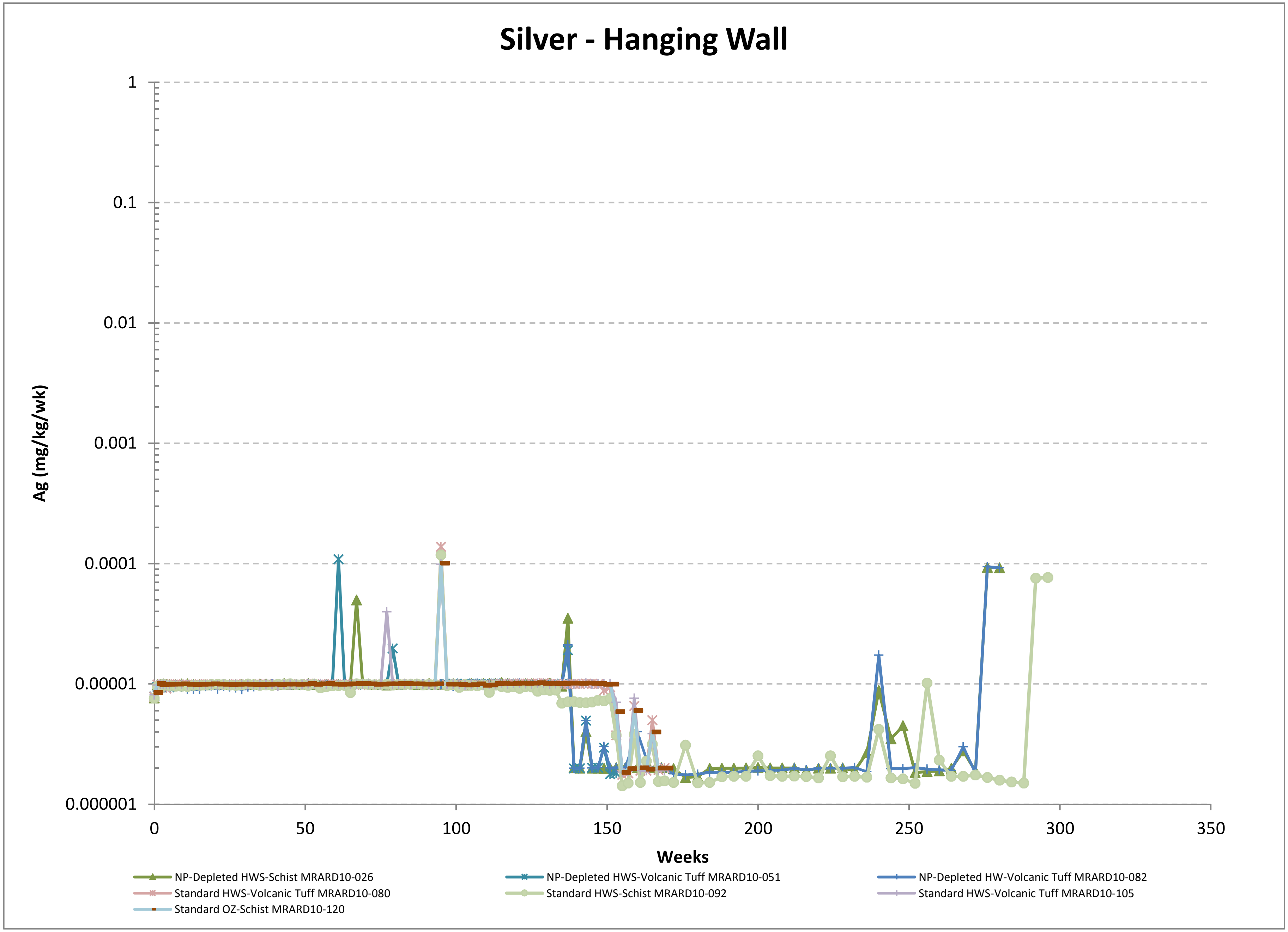


Acidity - Footwall
Acidity (mg/kg CaCO3/wk)
1000
100
10
1
0.1
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

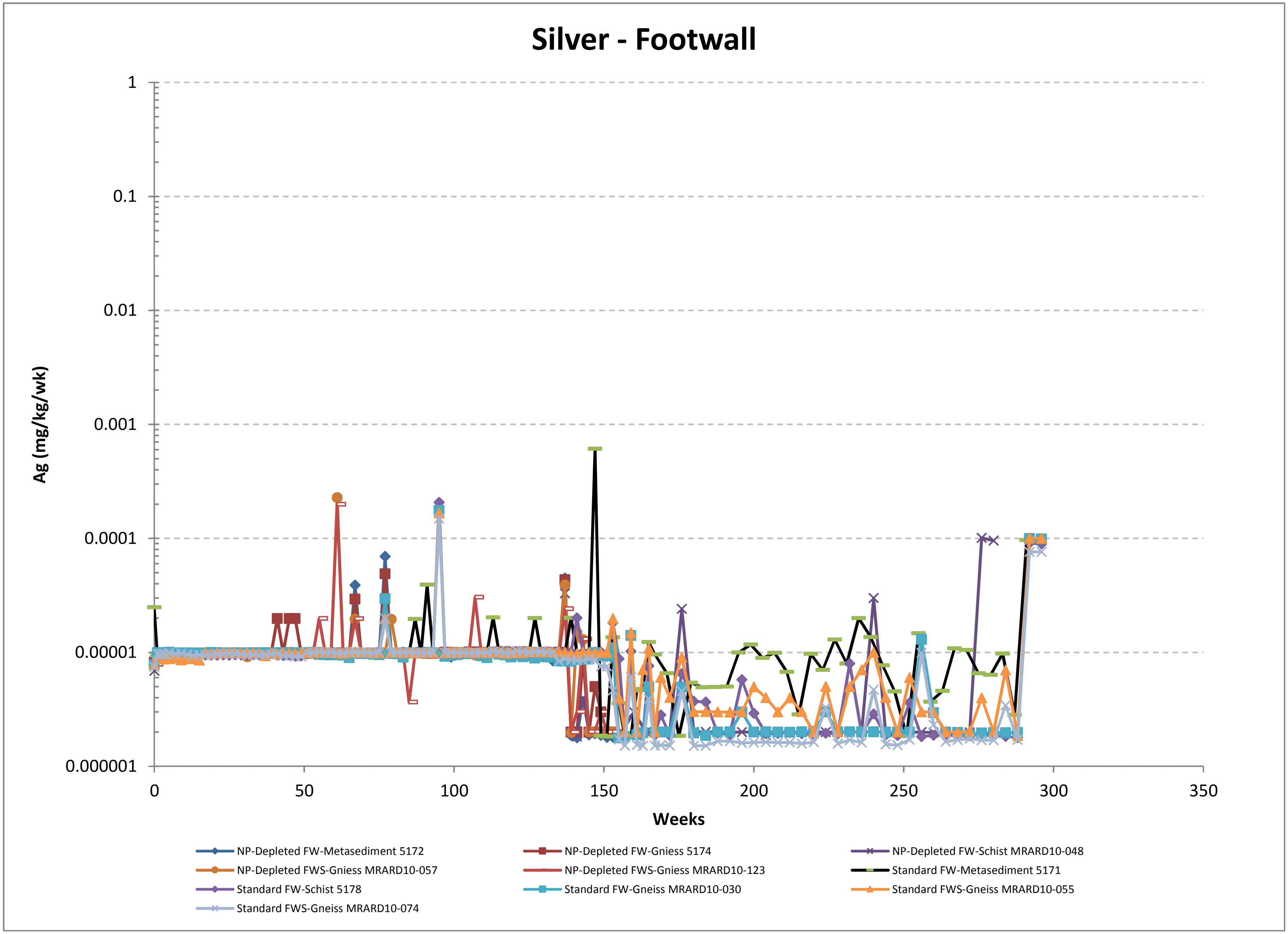


Alkalinity - Hanging Wall
Alkalinity (mg/kg CaCO3/wk)
100
10
1
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

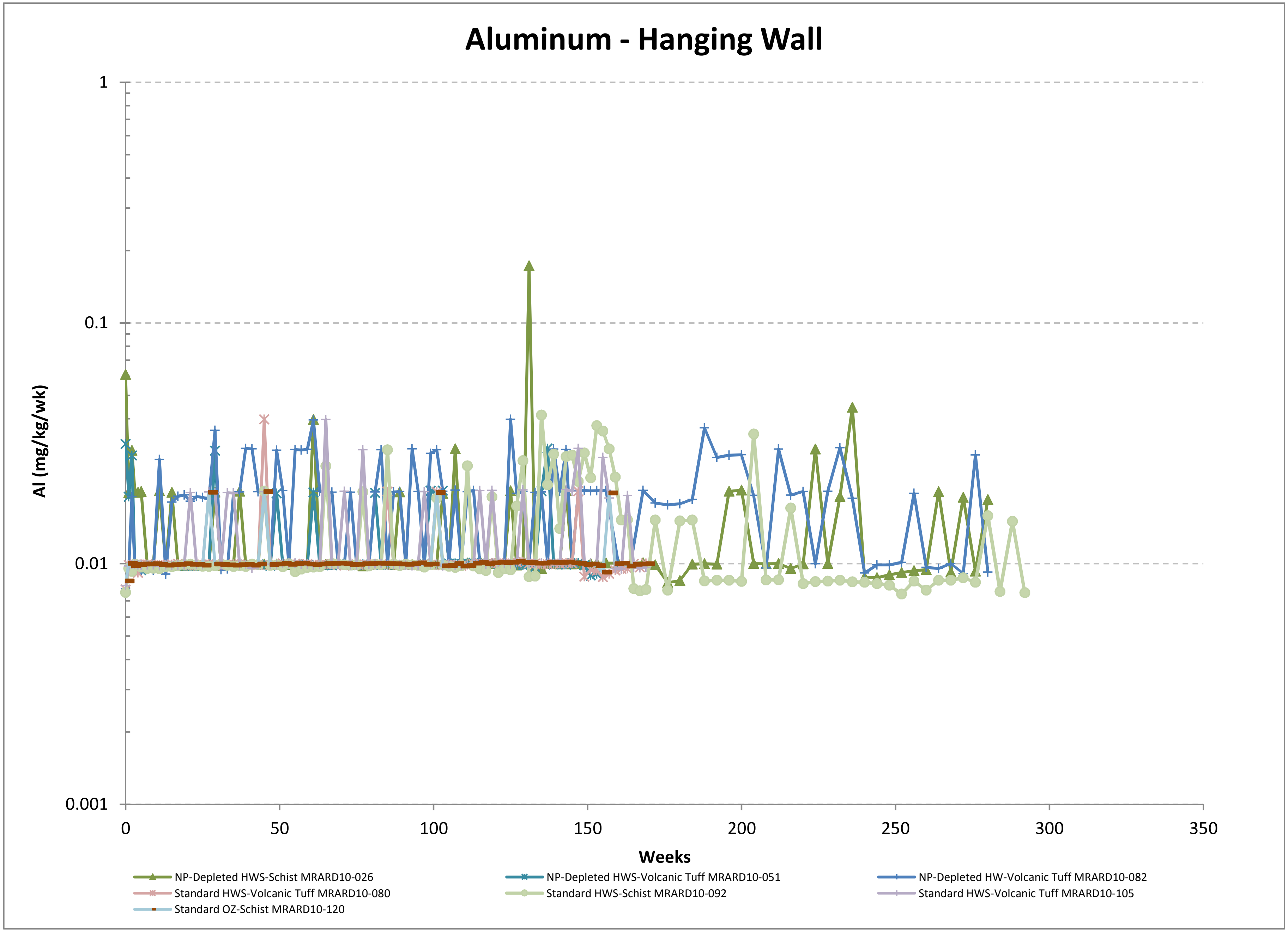

Alkalinity - Footwall
Alkalinity (mg/kg CaCO3/wk)
100
10
1
0.1
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



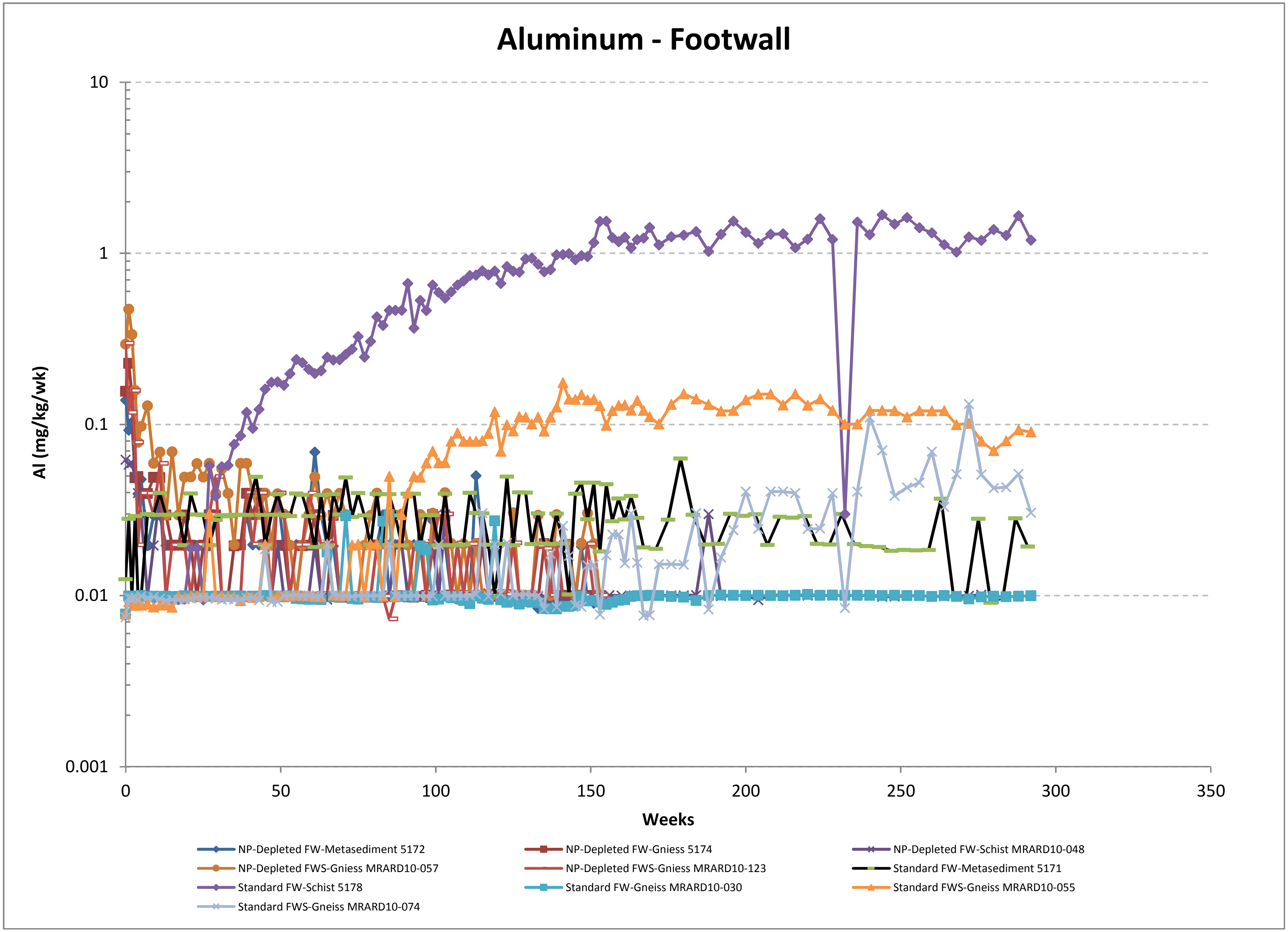
Silver - Hanging Wall
Ag (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



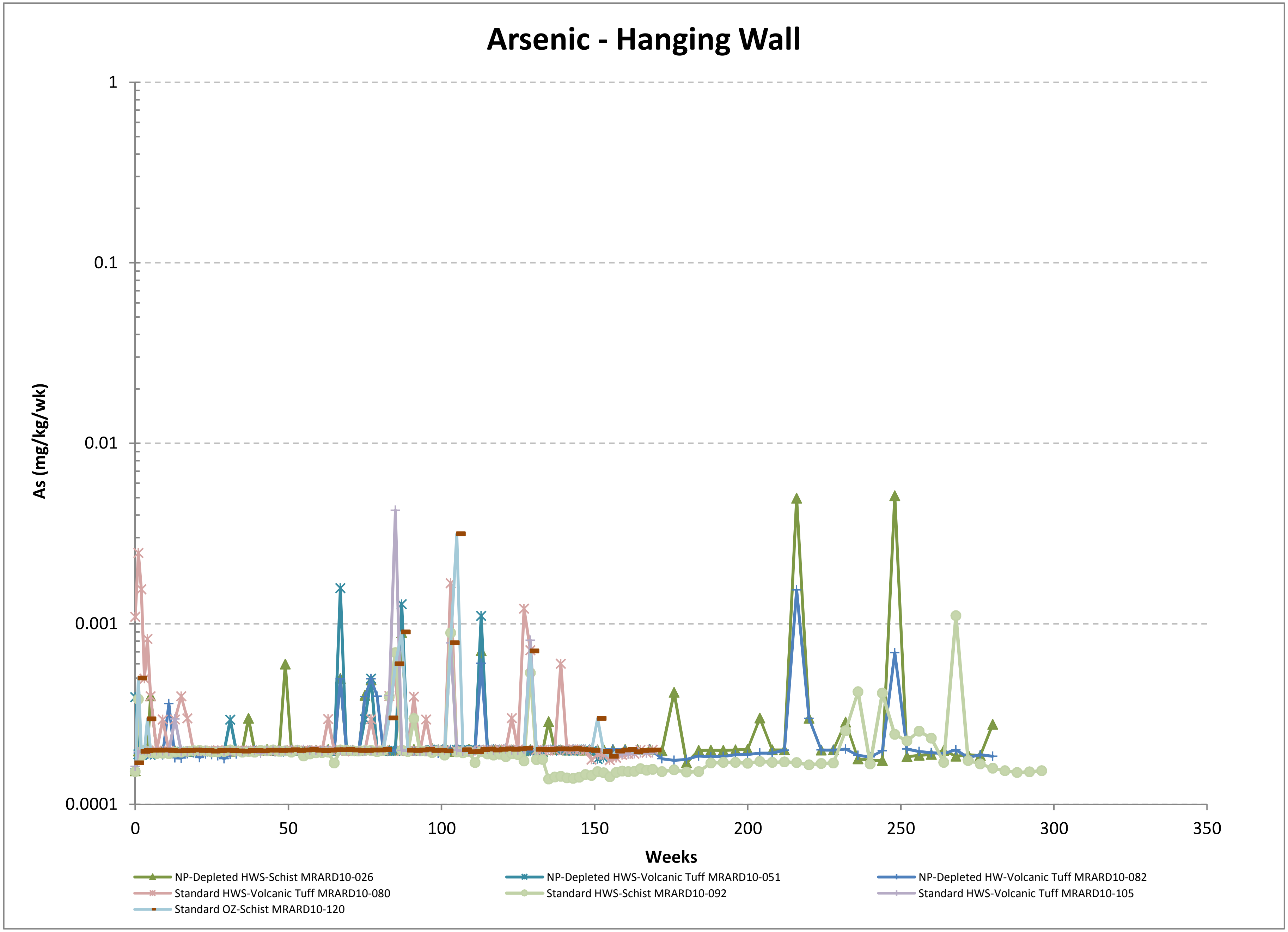
Silver - Footwall
Ag (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Giness 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



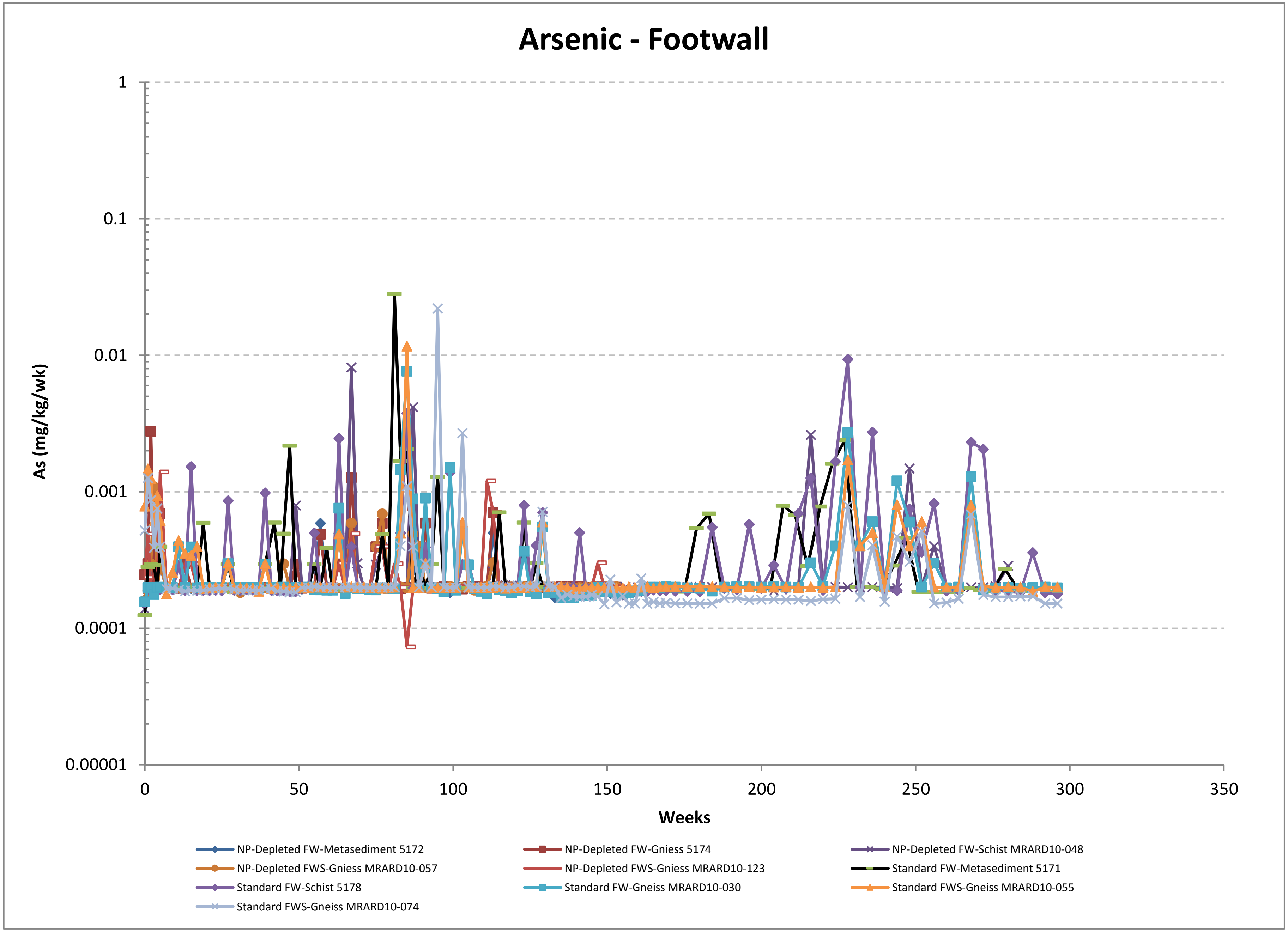
Aluminum - Hanging Wall
Al (mg/kg/wk)
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



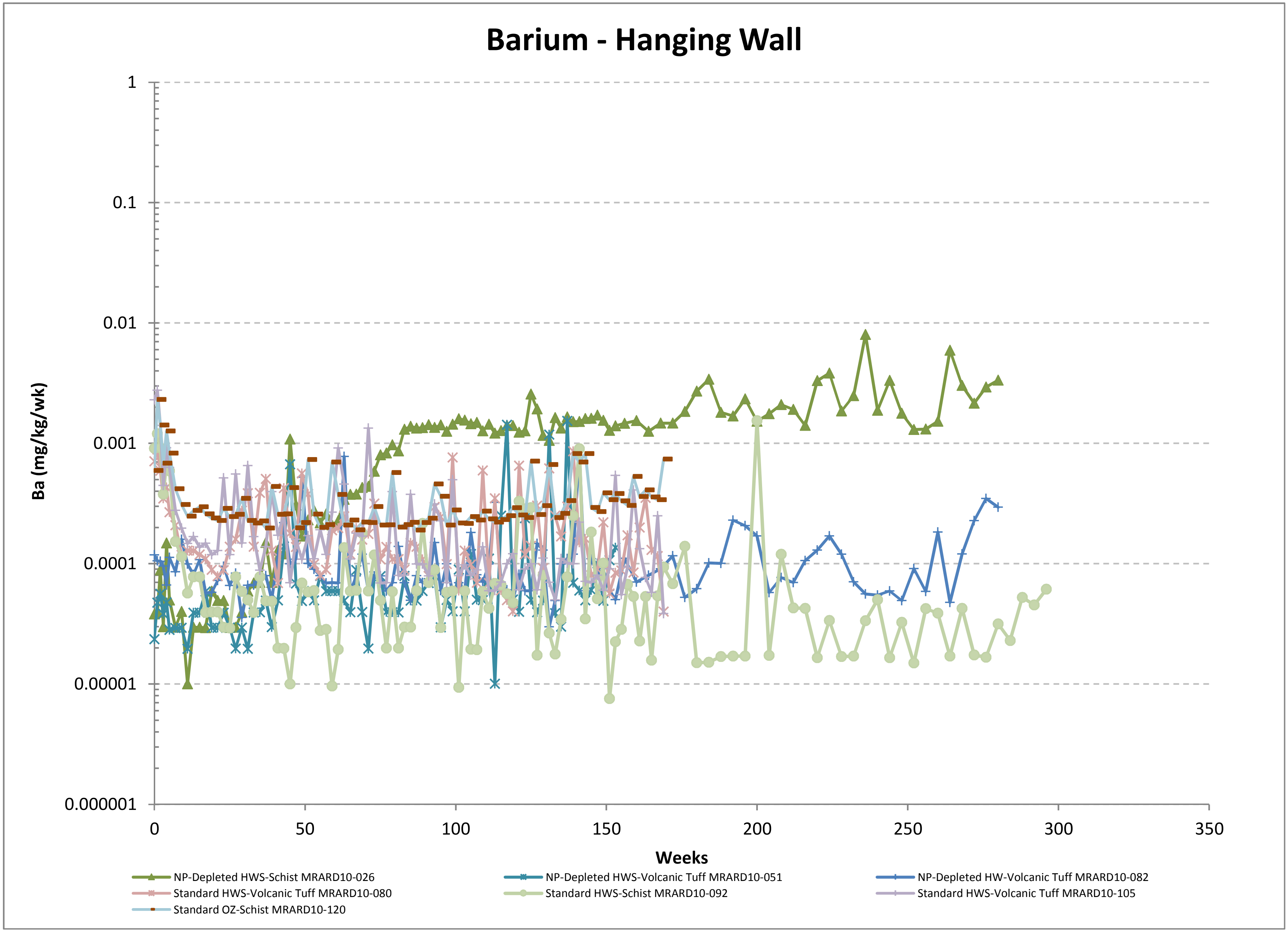
Aluminum - Footwall
Al (mg/kg/wk)
10
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



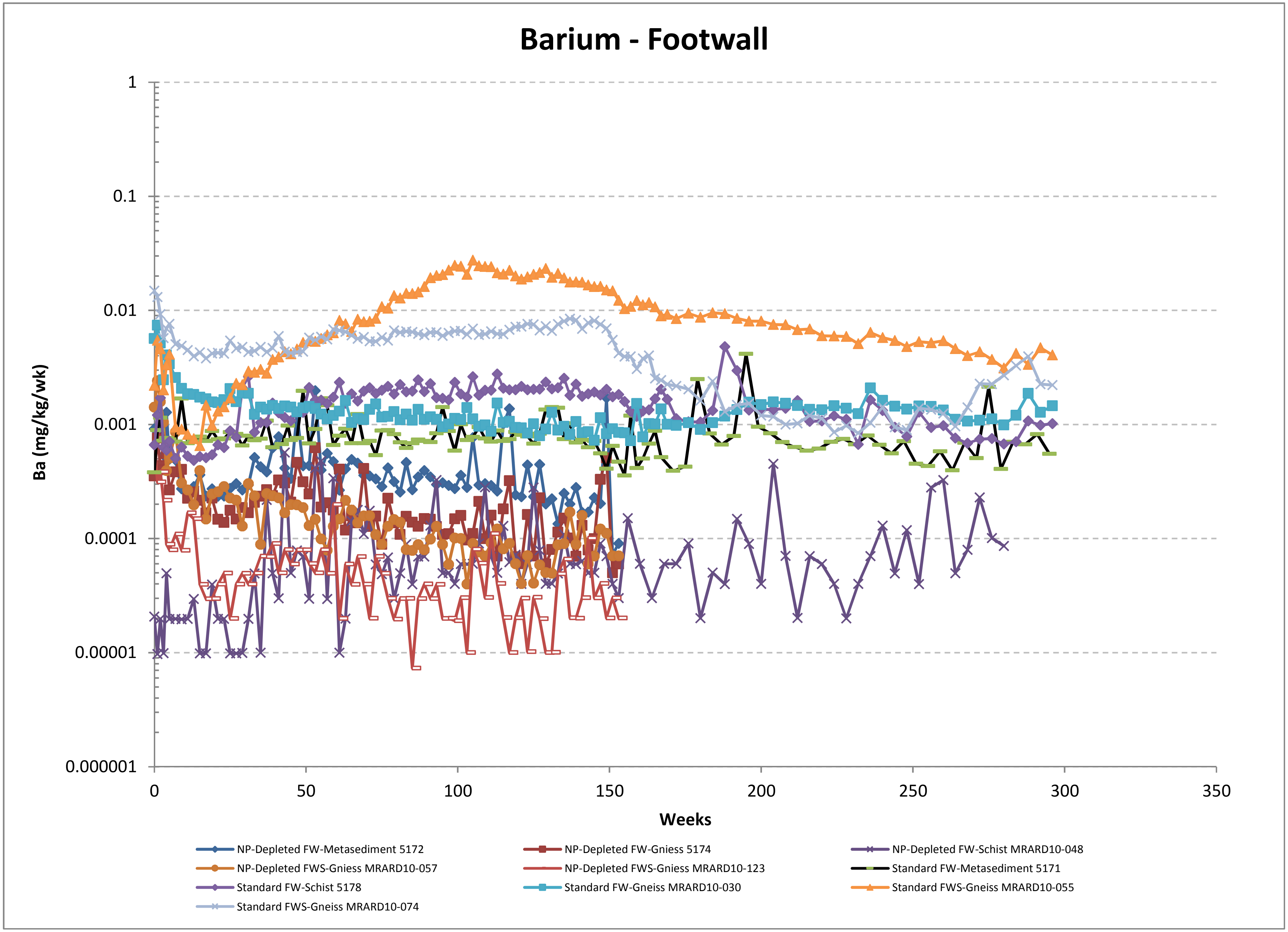
Arsenic - Hanging Wall
As (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



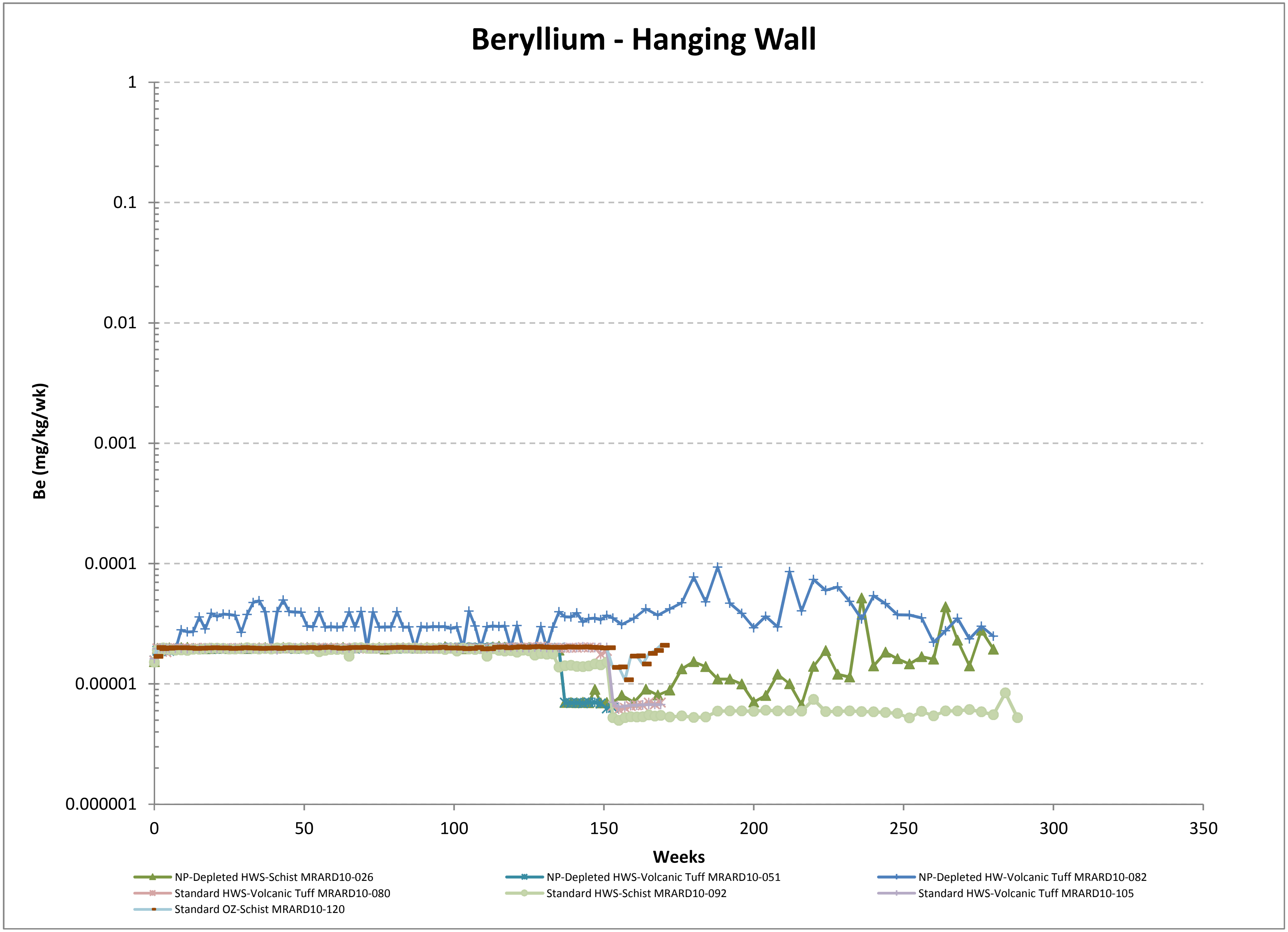
Arsenic - Footwall
As (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



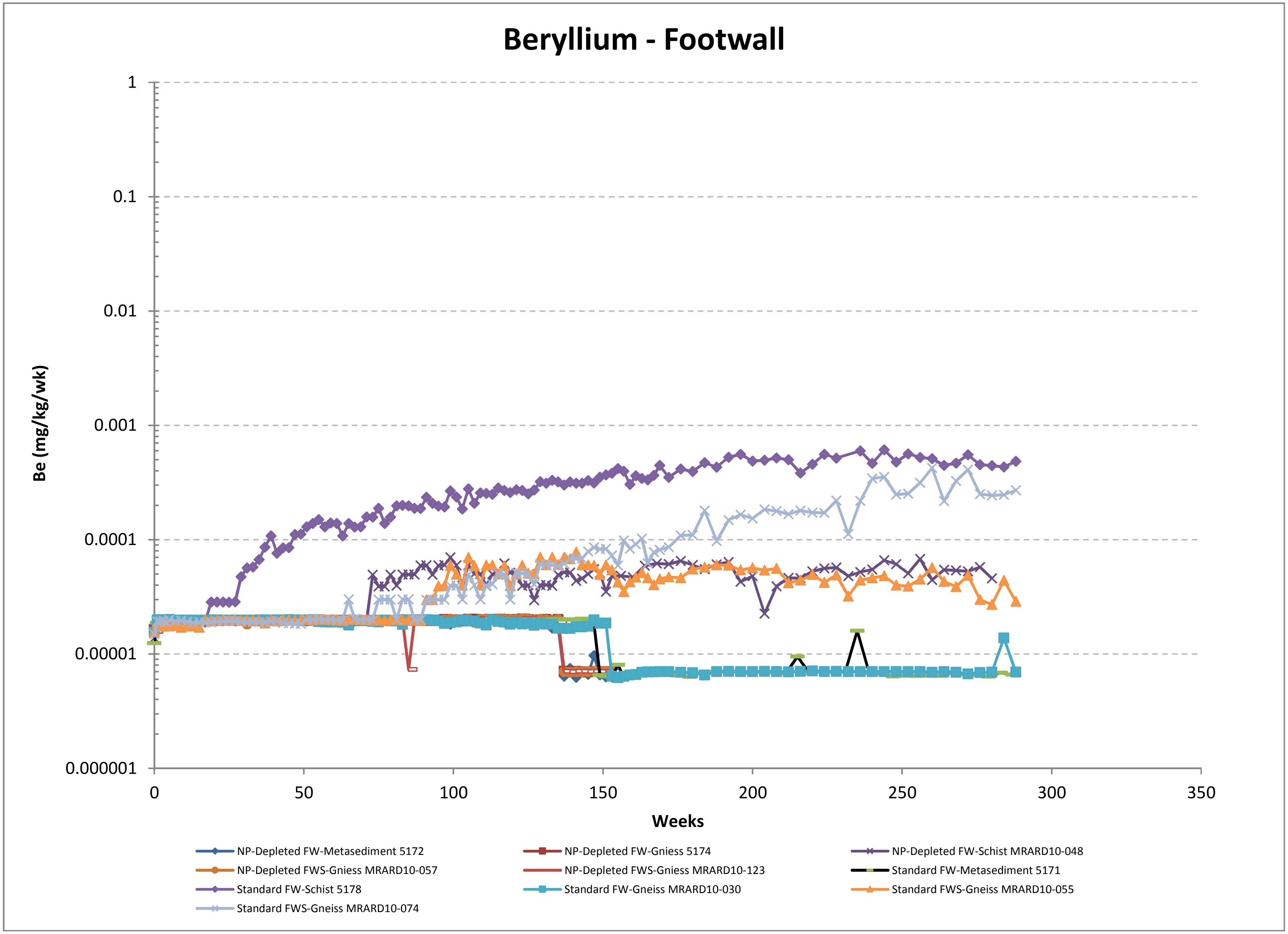
Barium - Hanging Wall
Ba (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

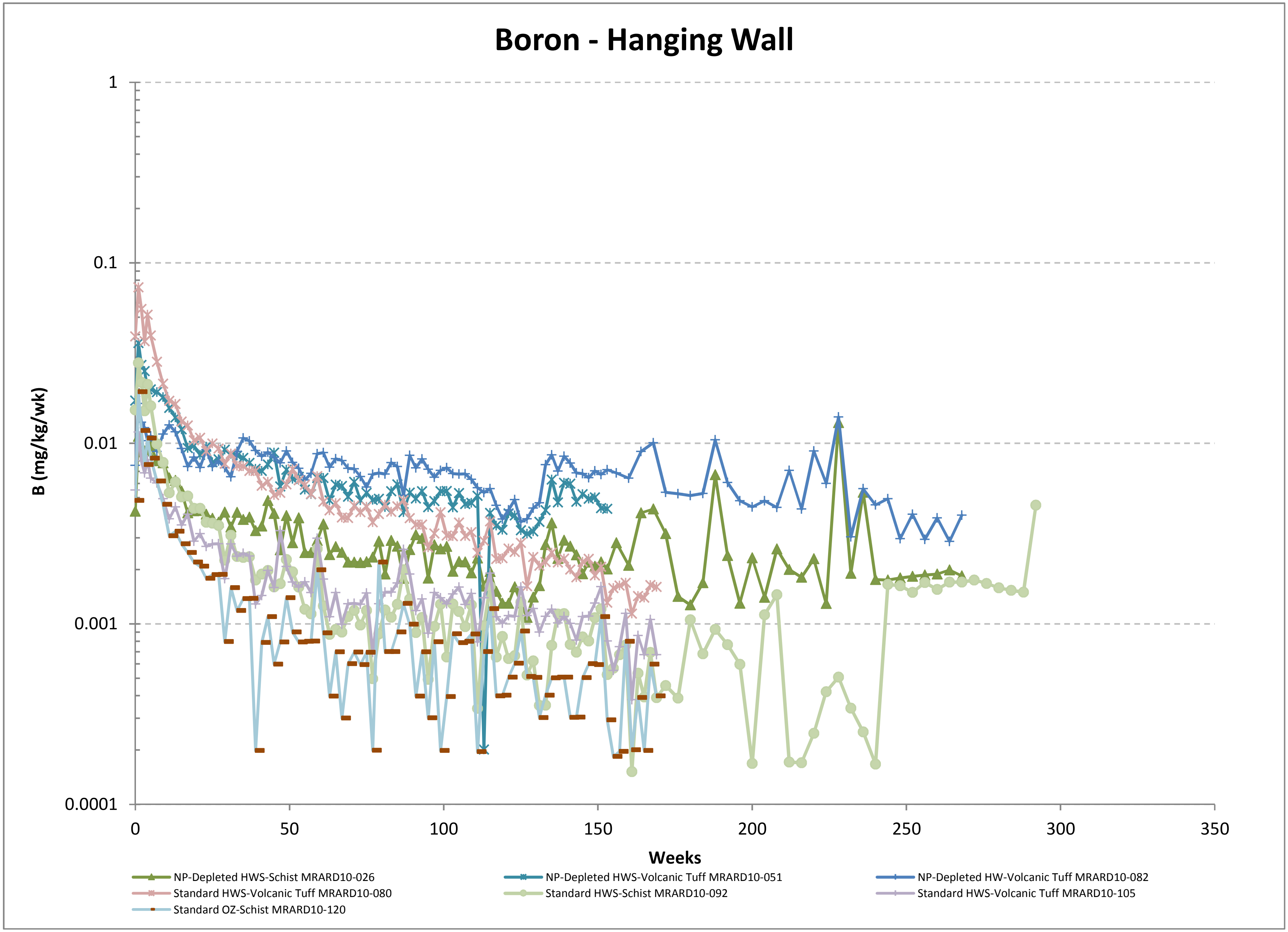


Barium - Footwall
Ba (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

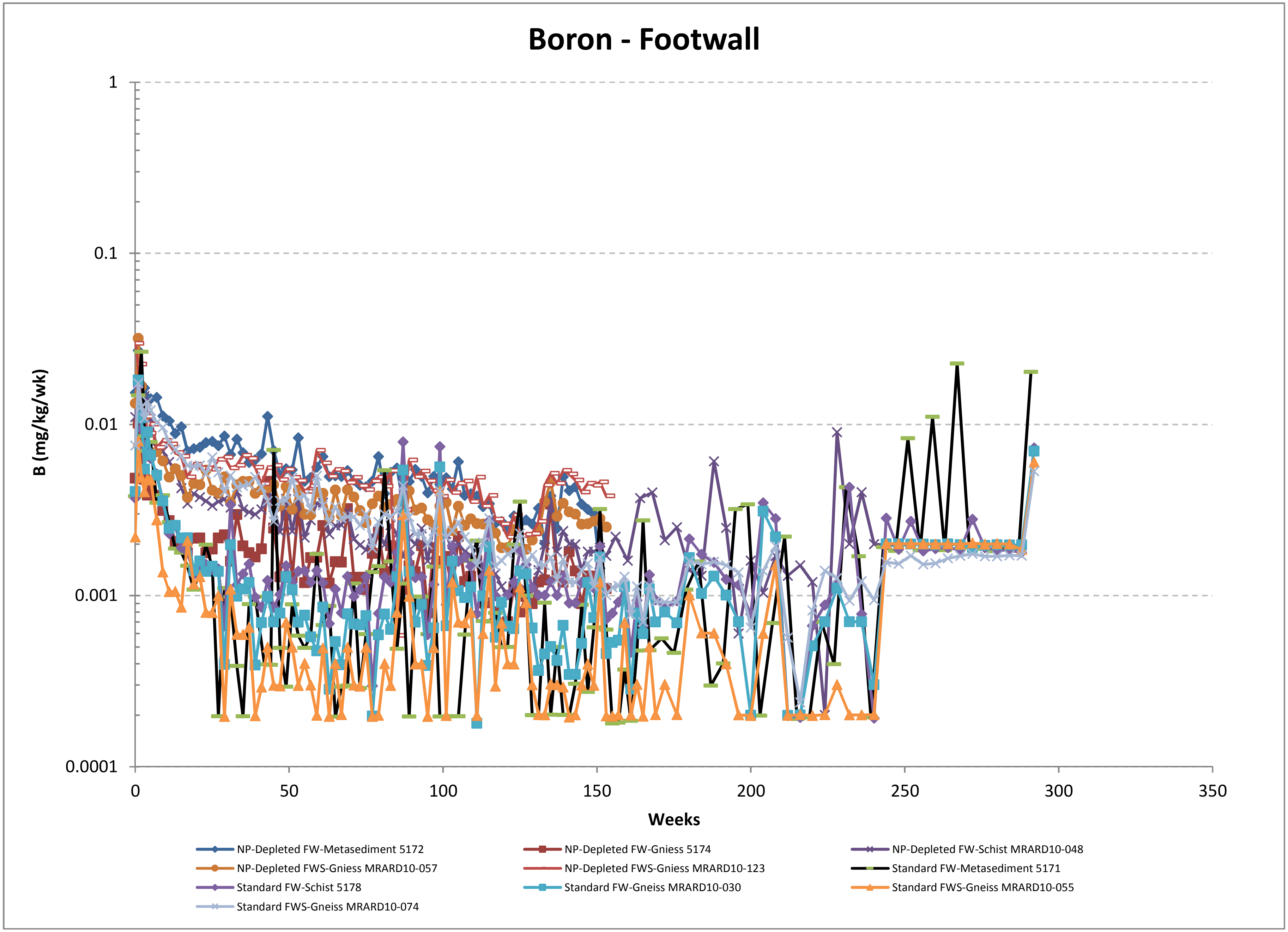


Beryllium - Hanging Wall
Be (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

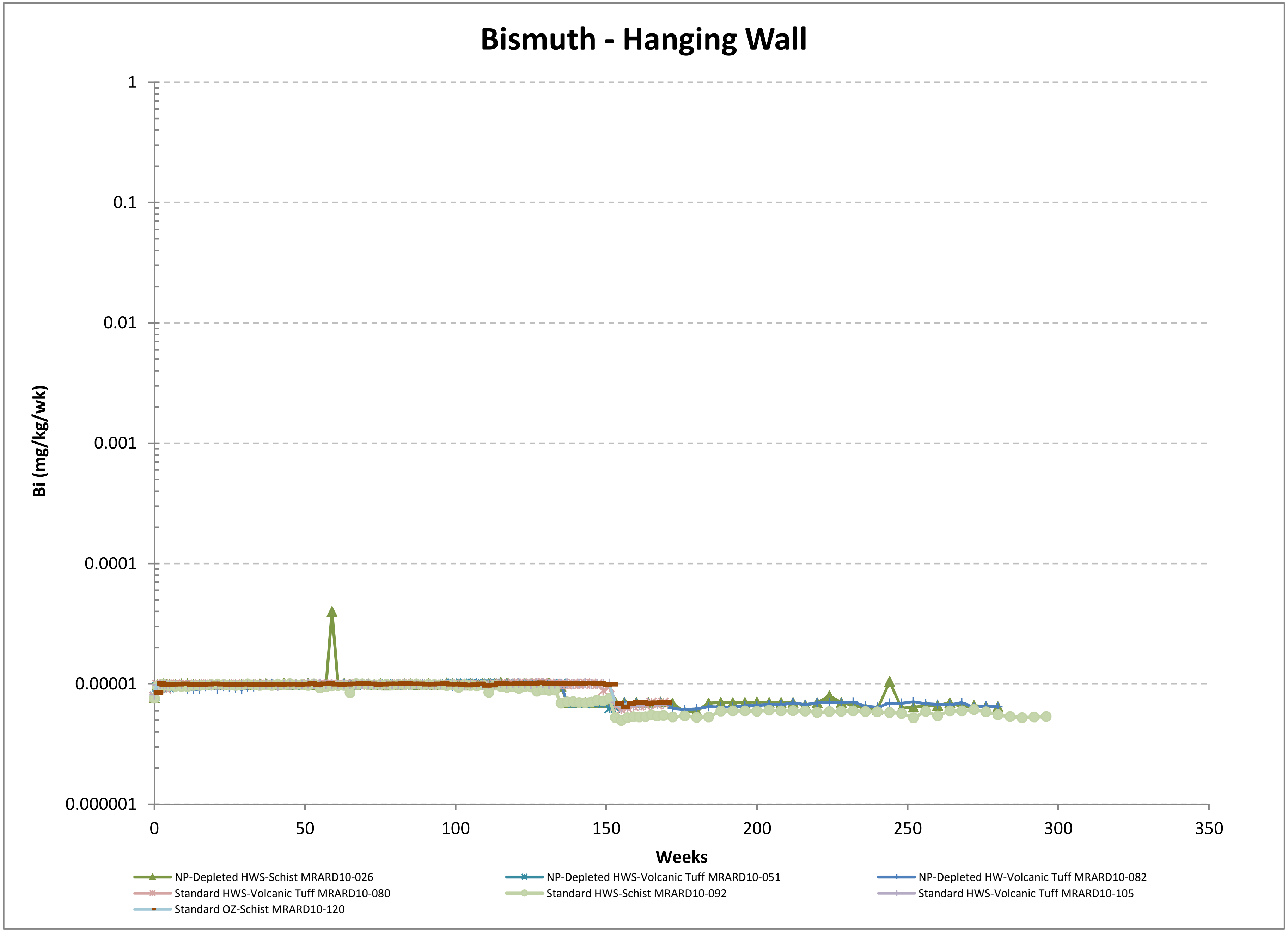

Beryllium - Footwall
Be (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



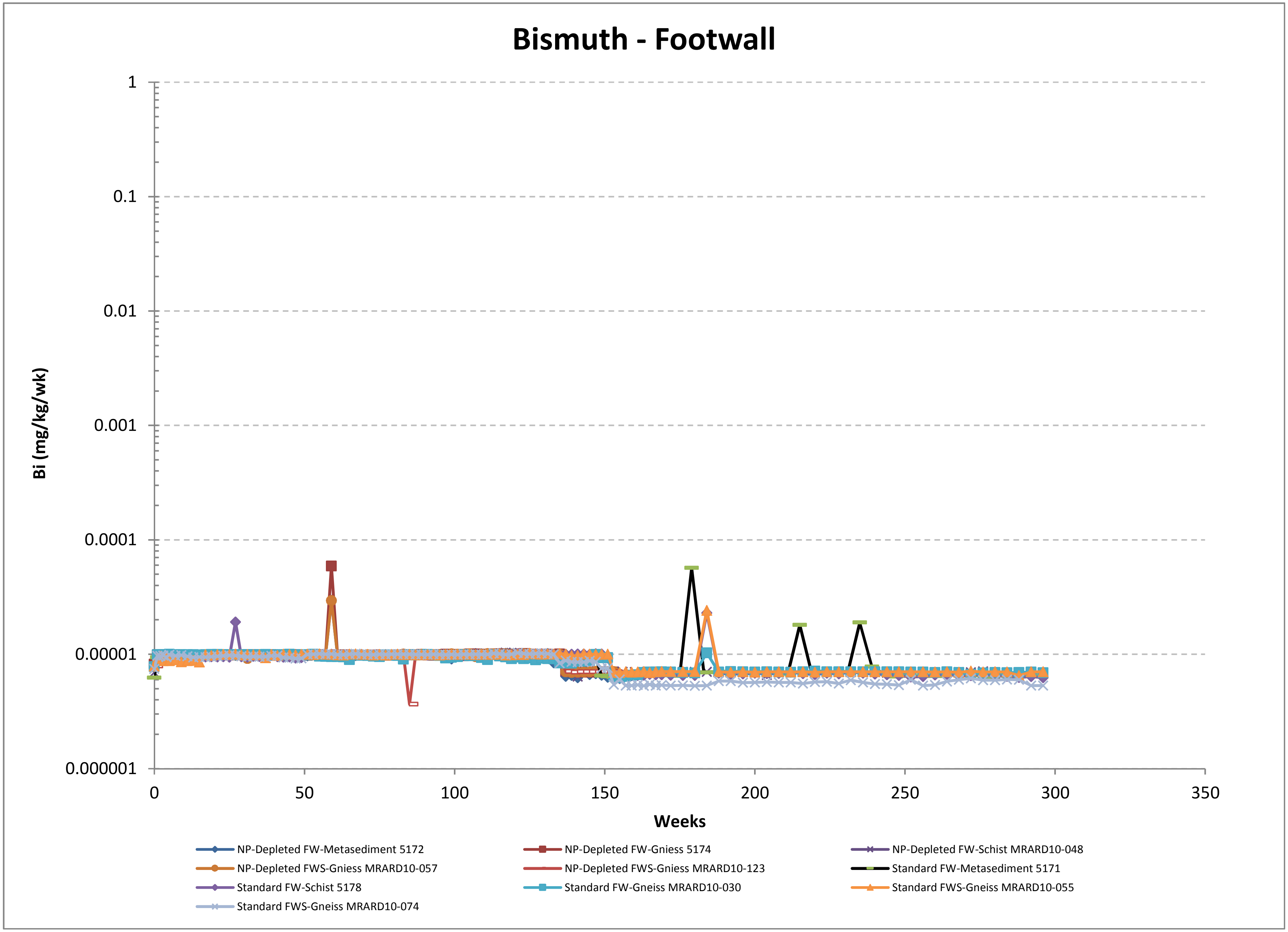
Boron - Hanging Wall
B (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



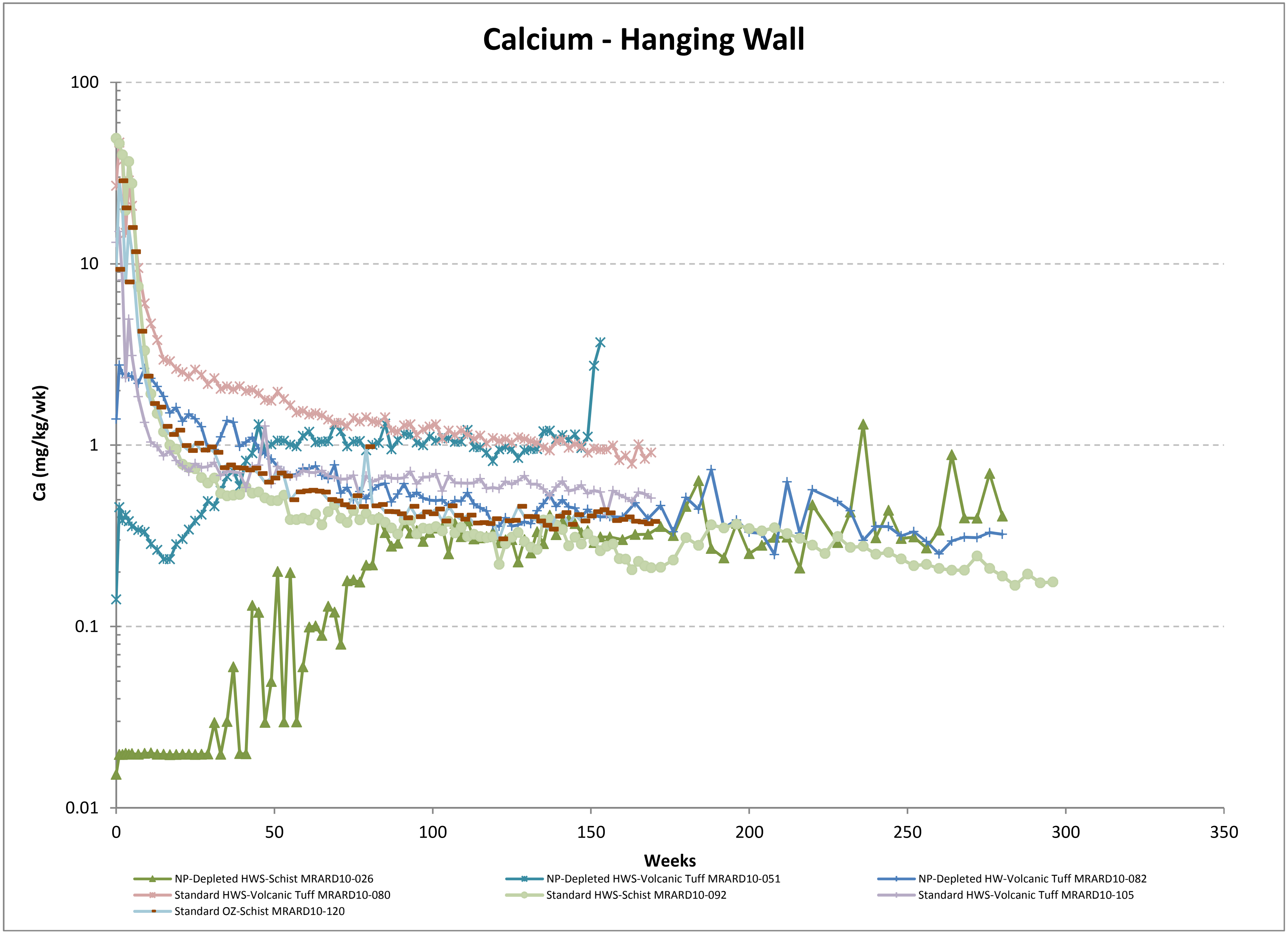
Boron - Footwall
B (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



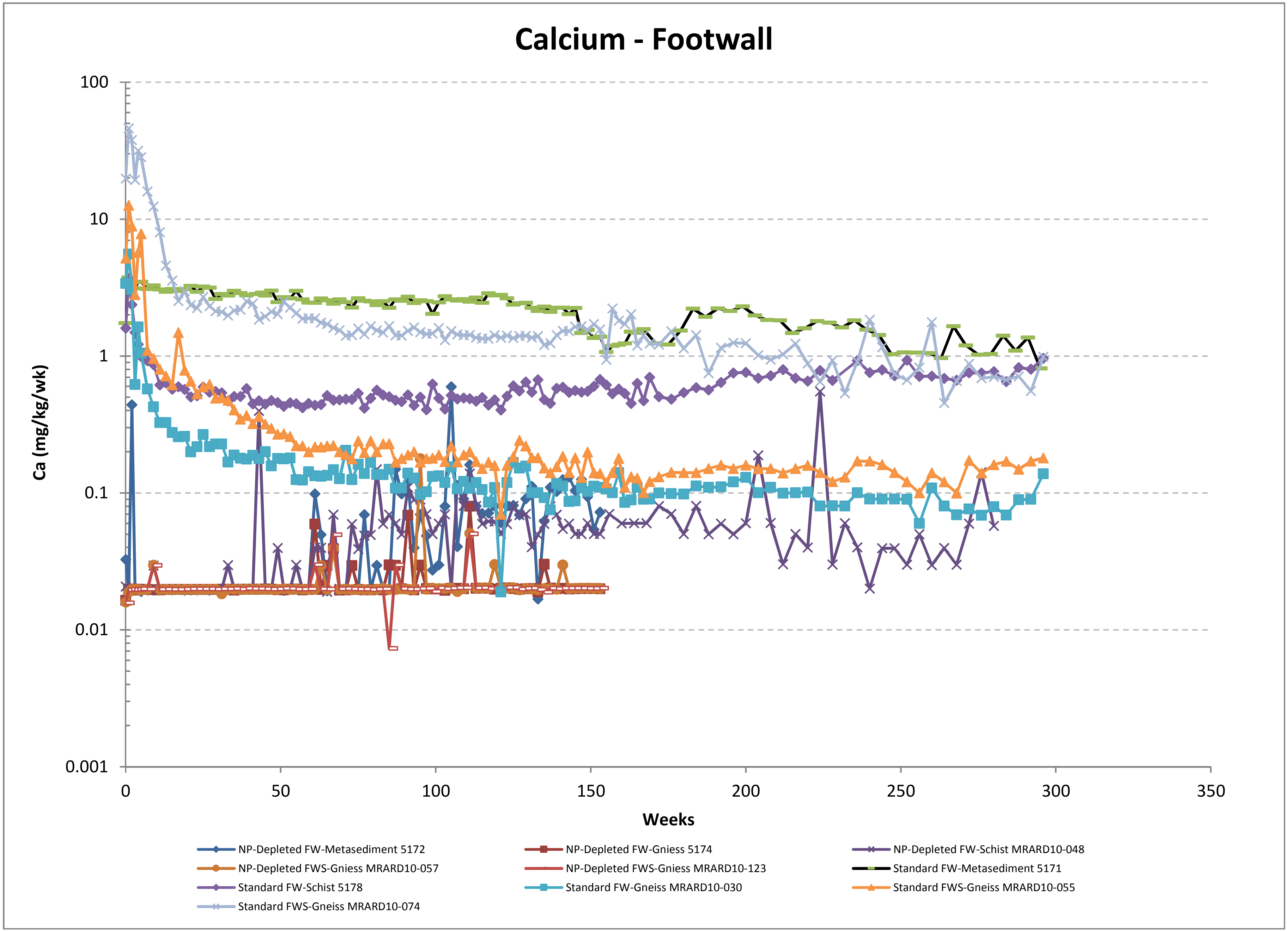
Bismuth - Hanging Wall
Bi (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



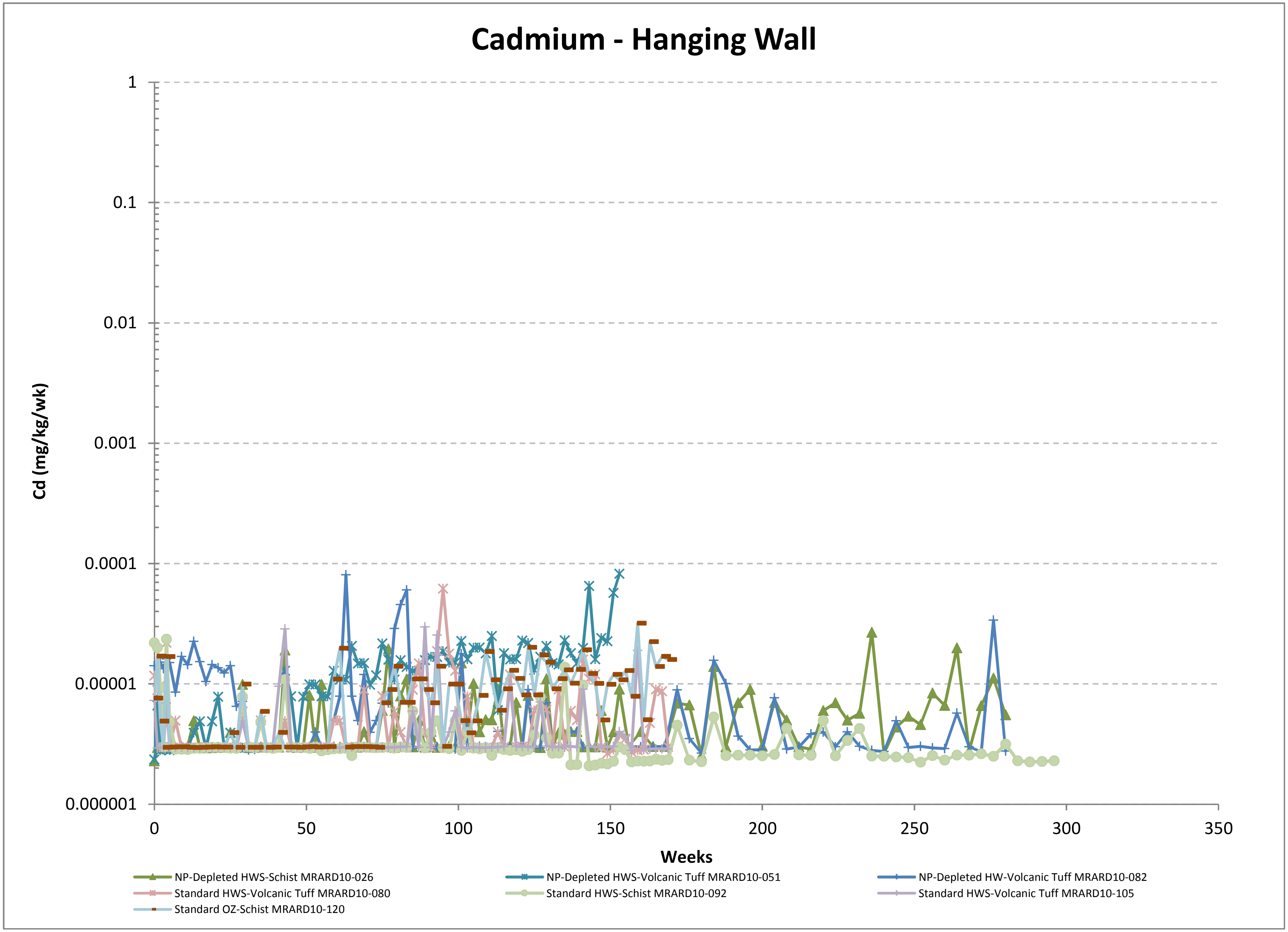
Bismuth - Footwall
Bi (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

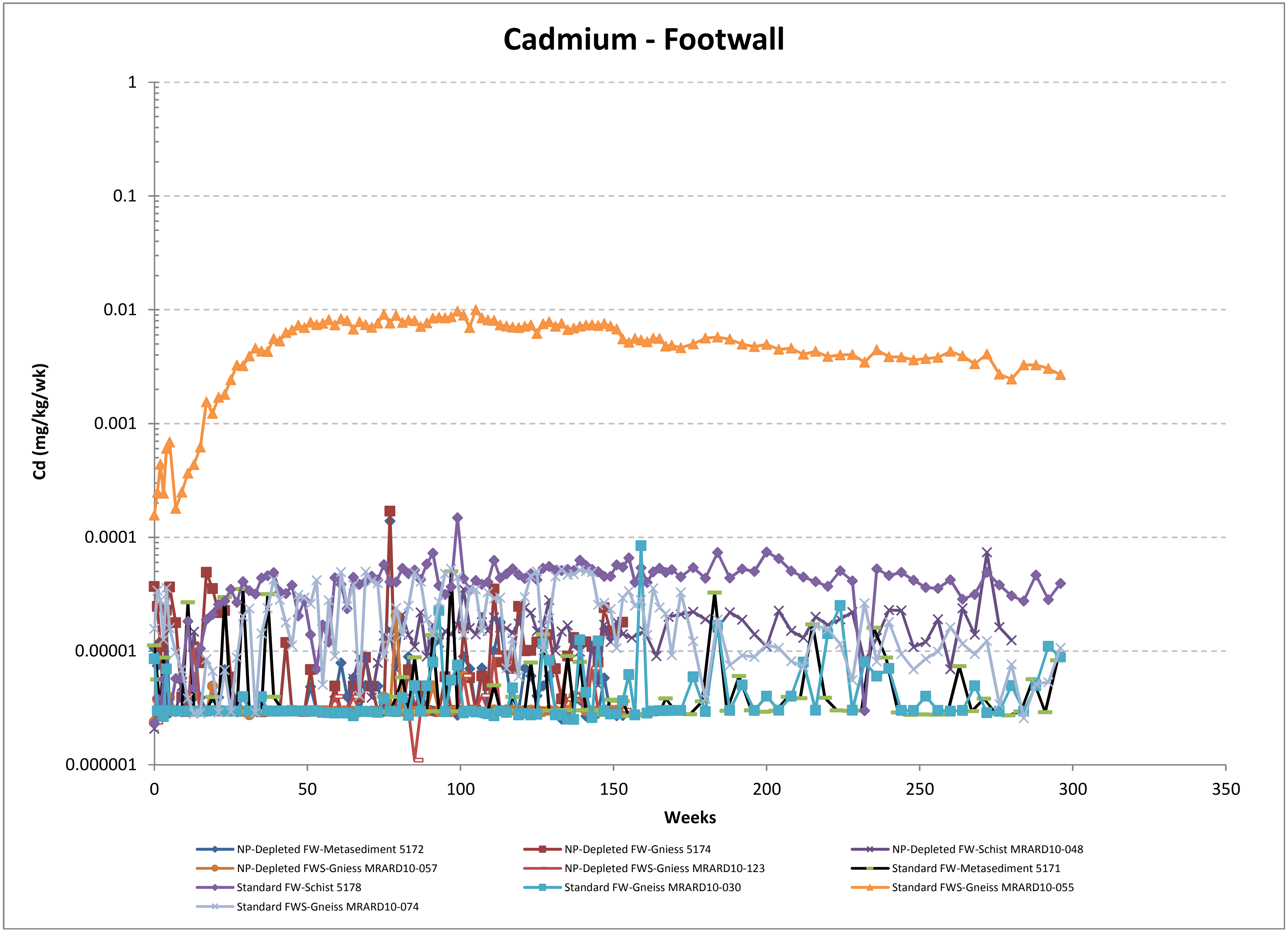


Calcium - Hanging Wall
Ca (mg/kg/wk)
100
10
1
0.1
0.01
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

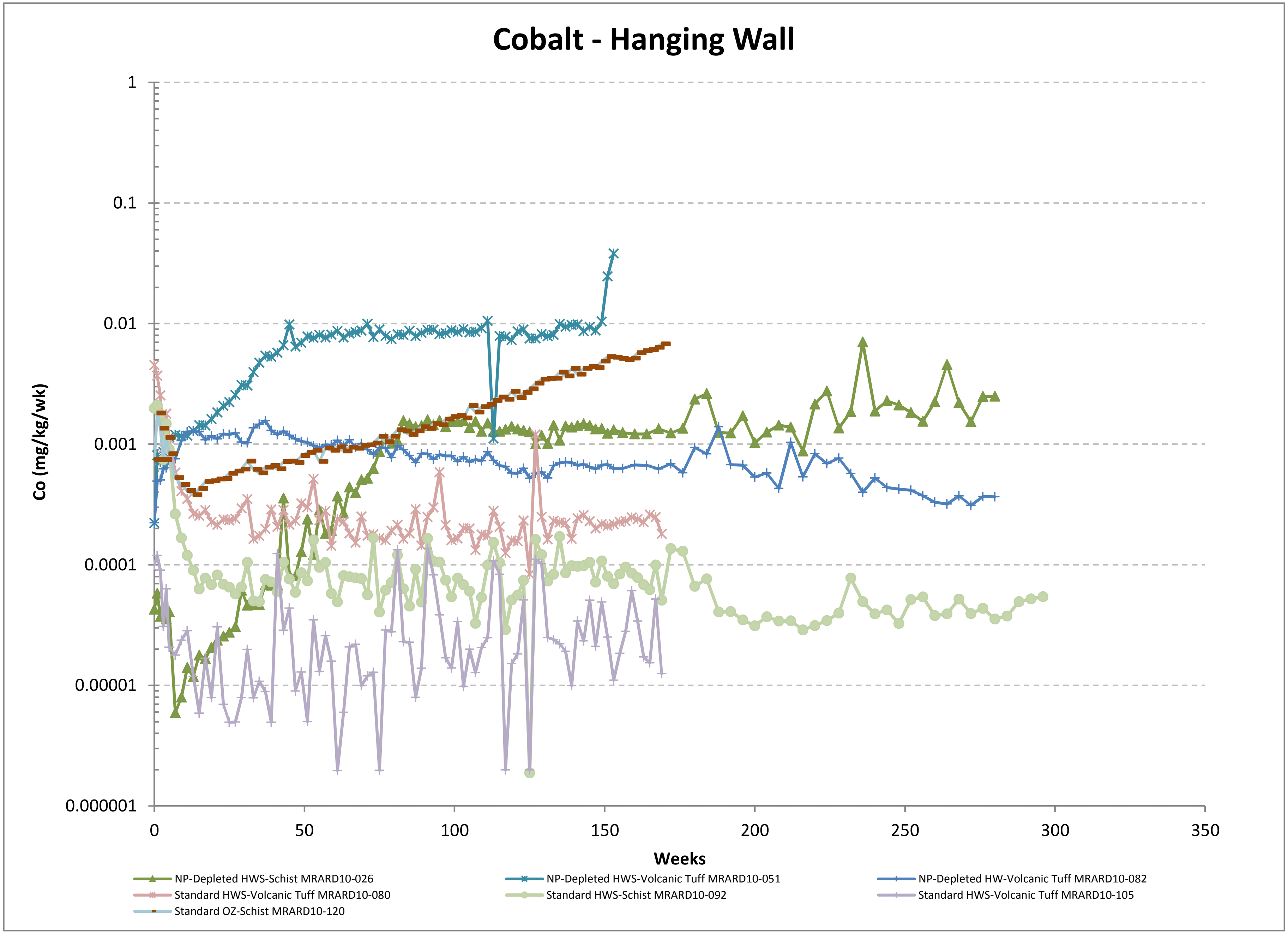


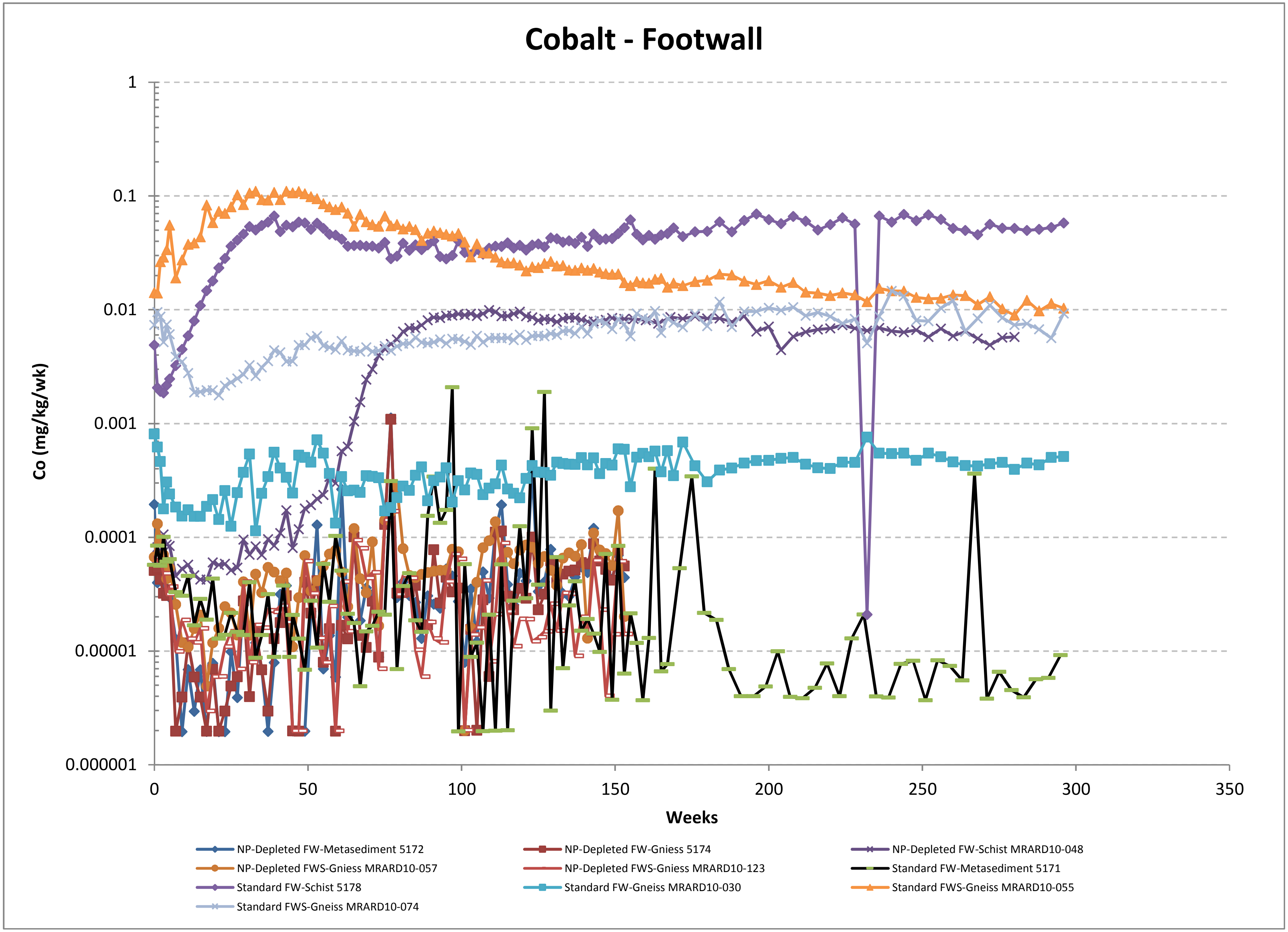
Calcium - Footwall
Ca (mg/kg/wk)
100
10
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074


Cadmium - Hanging Wall
Cd (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

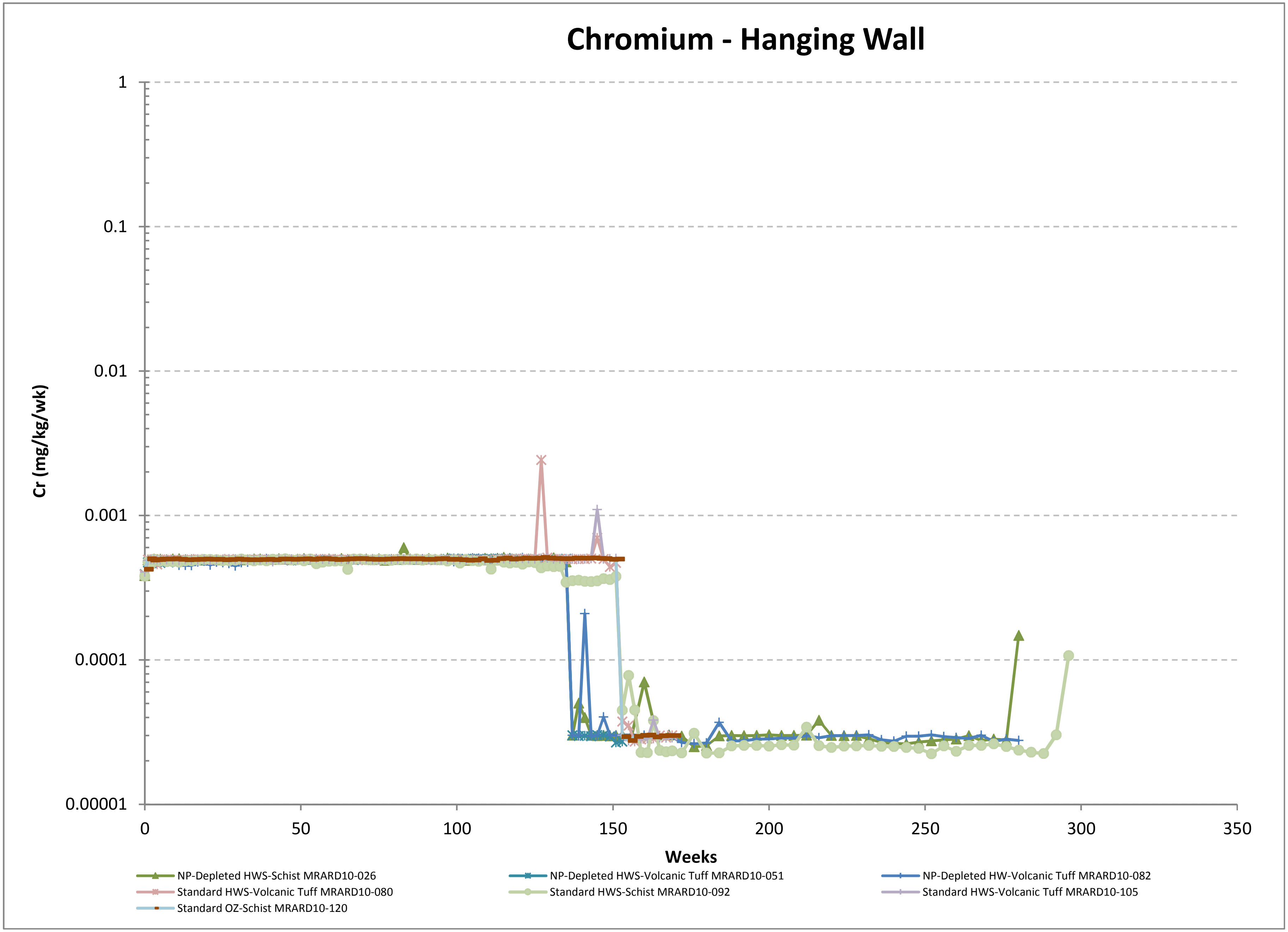


Cadmium - Footwall
Cd (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

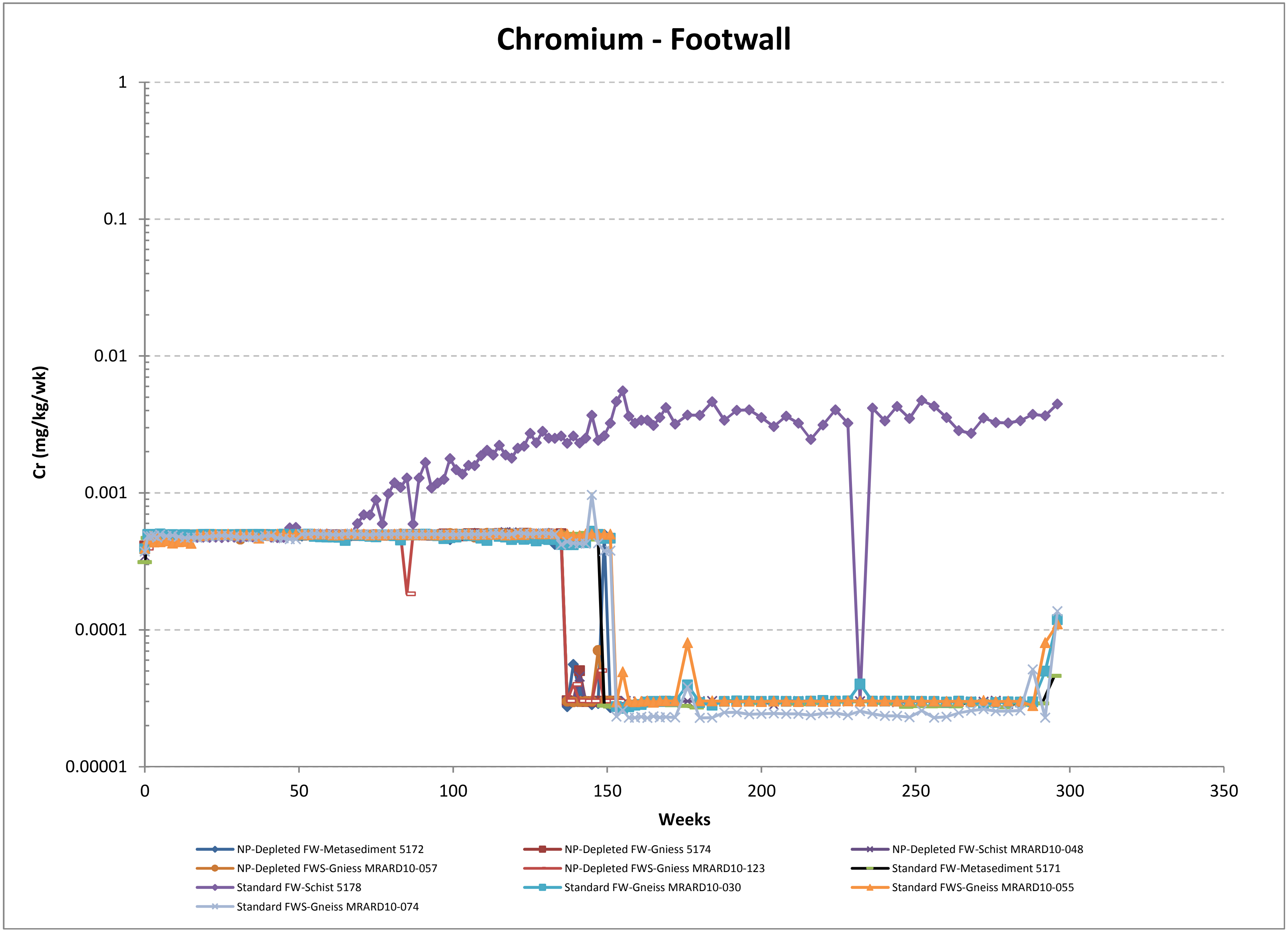

Cobalt - Hanging Wall
Co (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

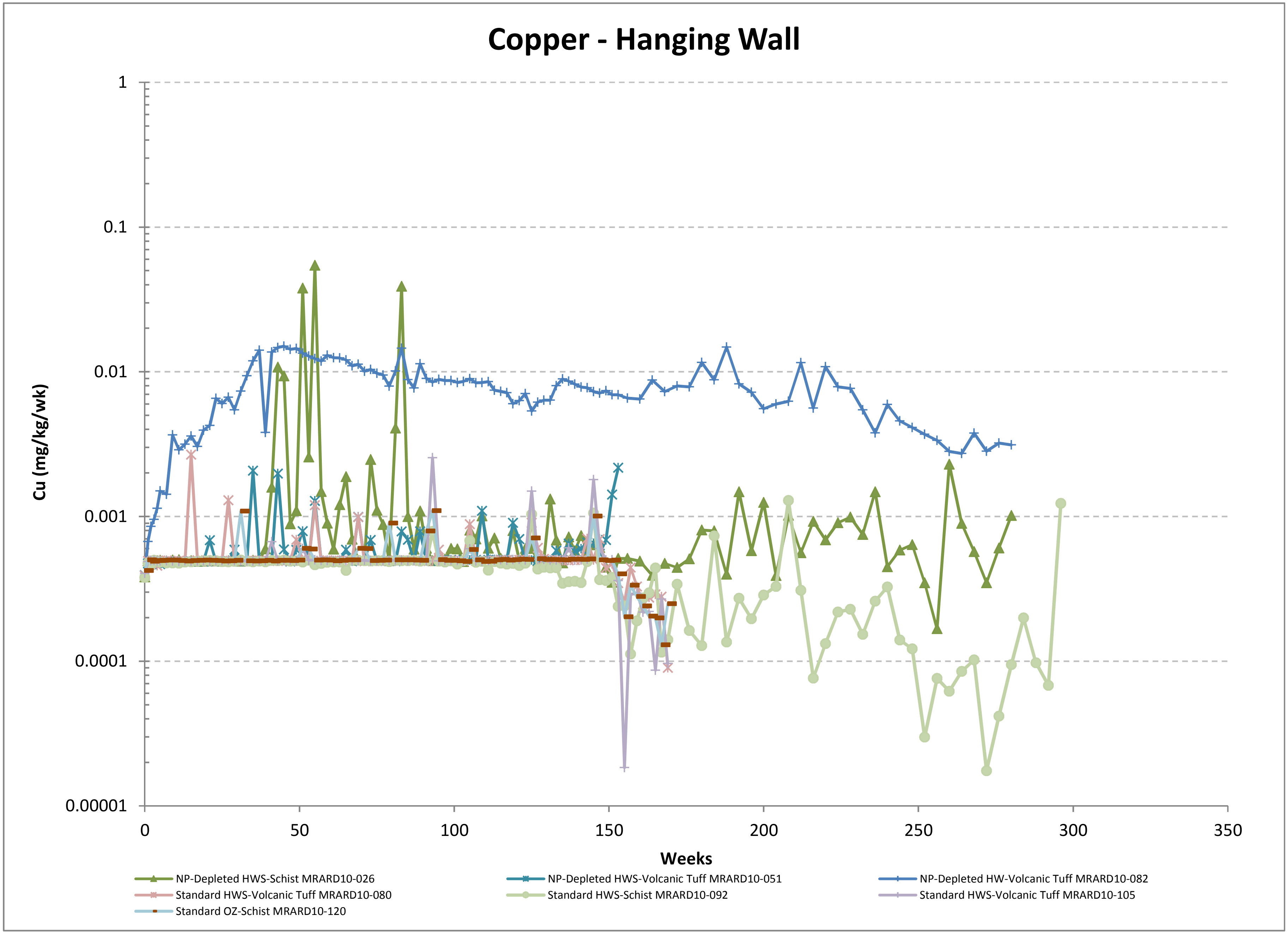


Cobalt - Footwall
Co (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

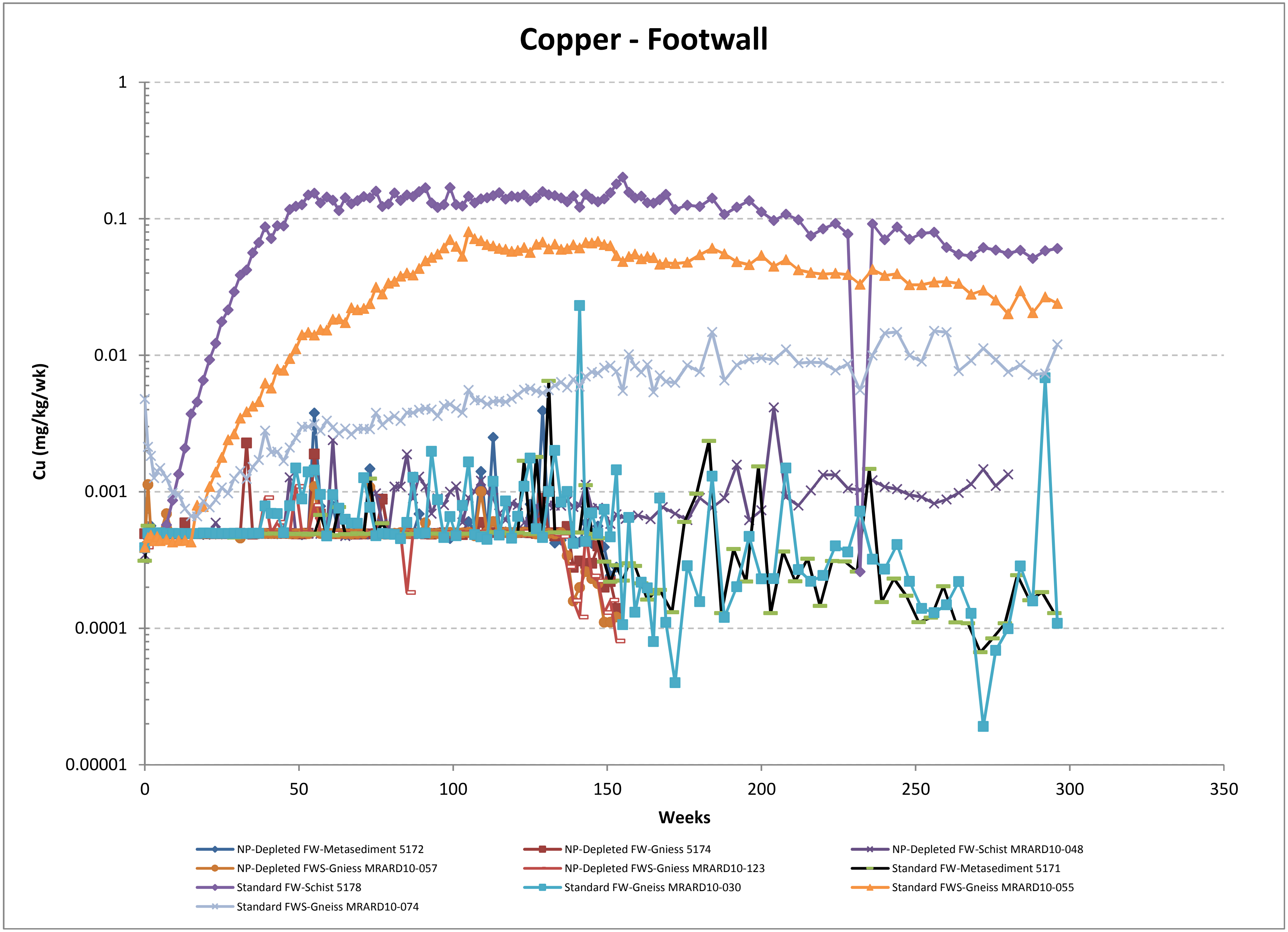


Chromium - Hanging Wall
Cr (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

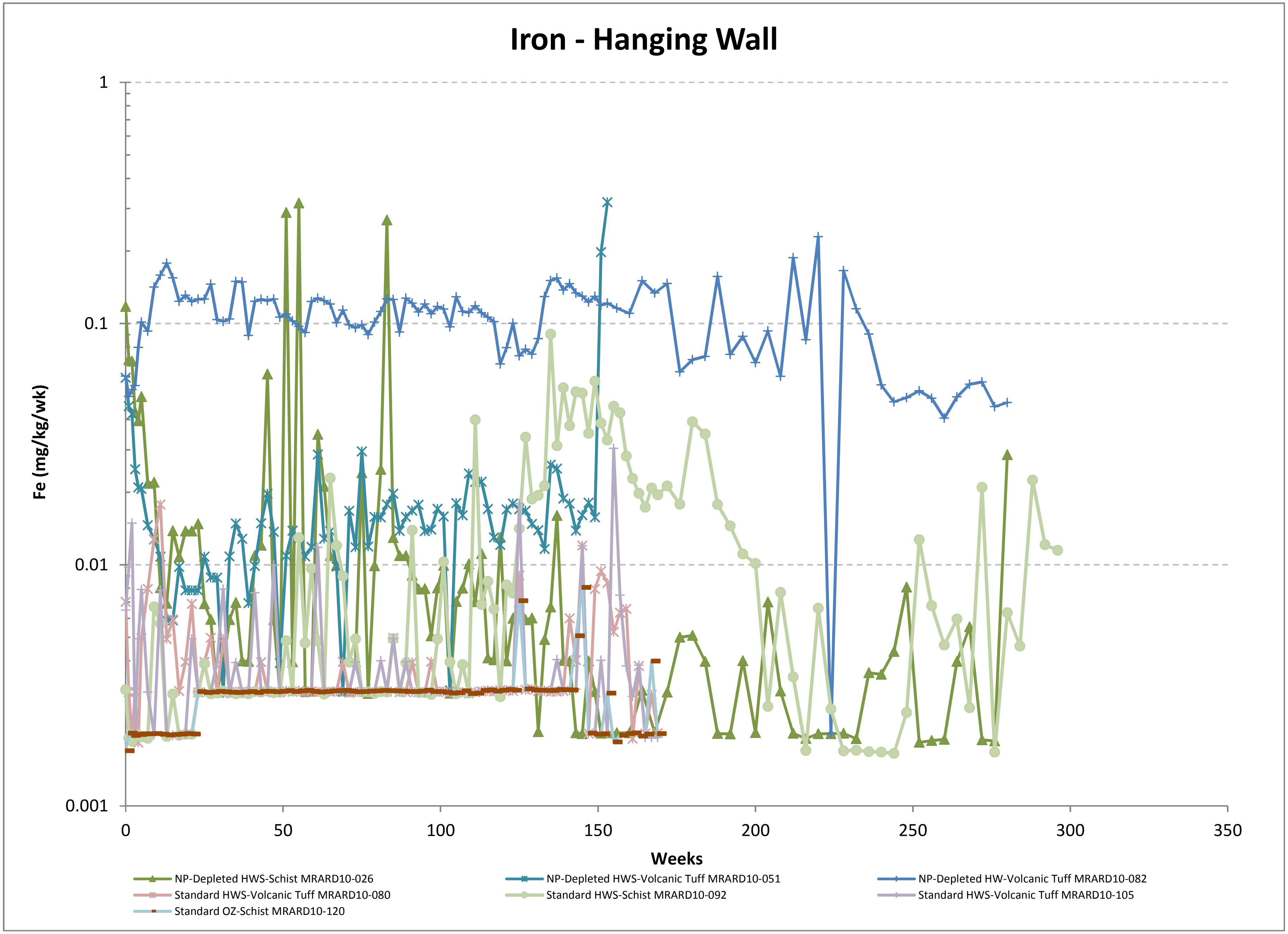

Chromium - Footwall
Cr (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



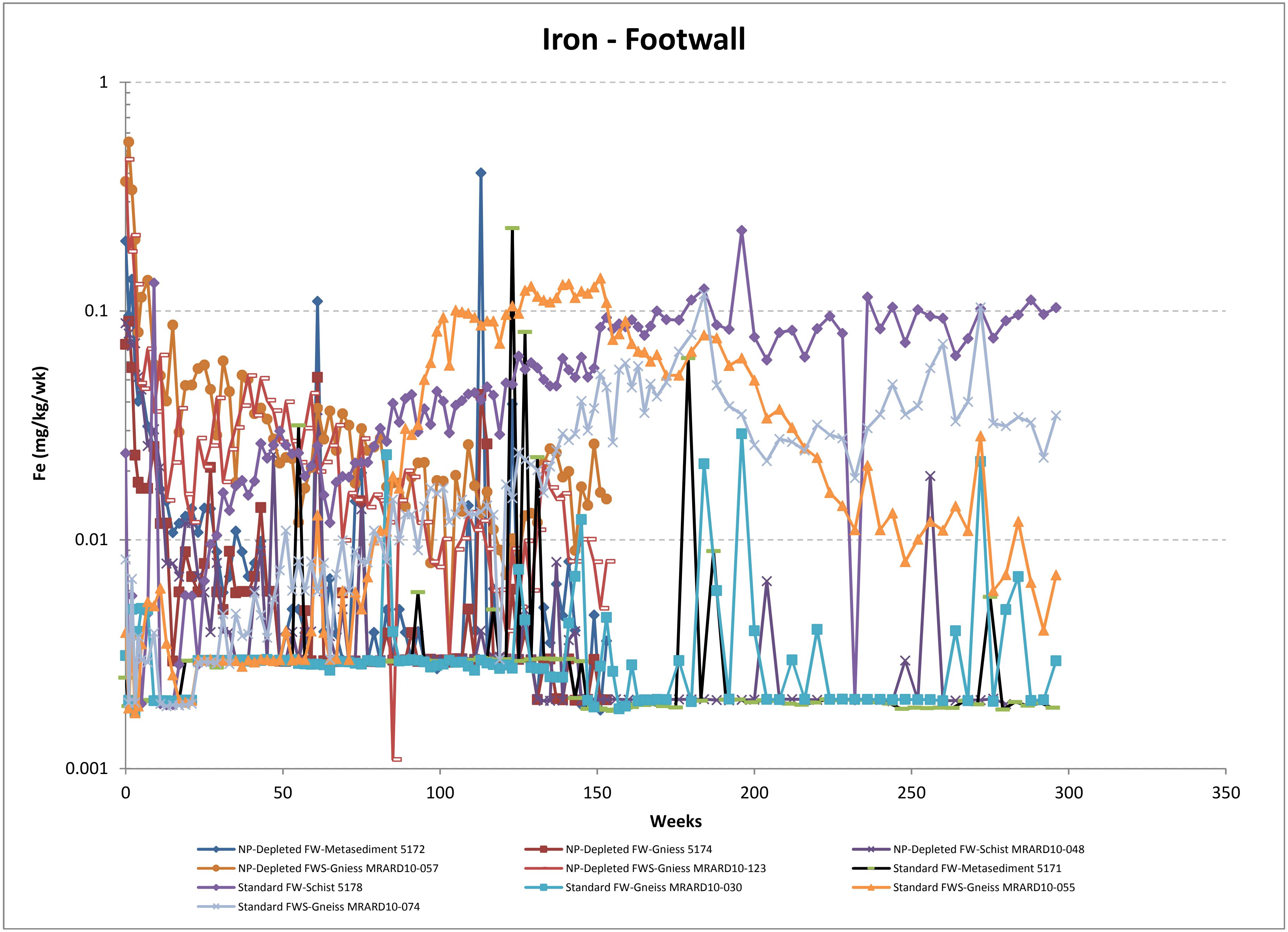
Copper - Hanging Wall
1
0.1
0.01
0.001
0.0001
0.00001
Cu (mg/kg/wk)
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



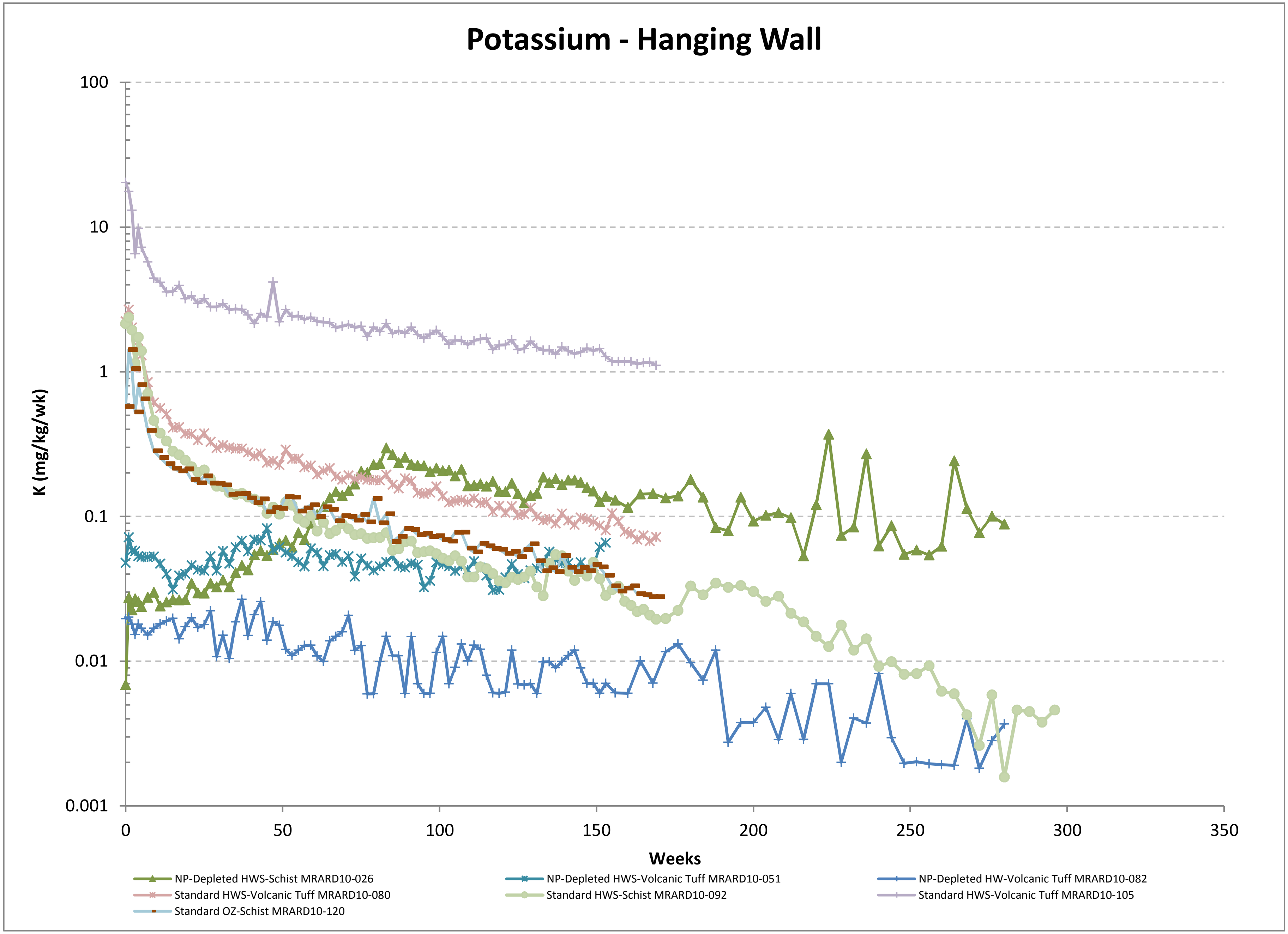
Copper - Footwall
Cu (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



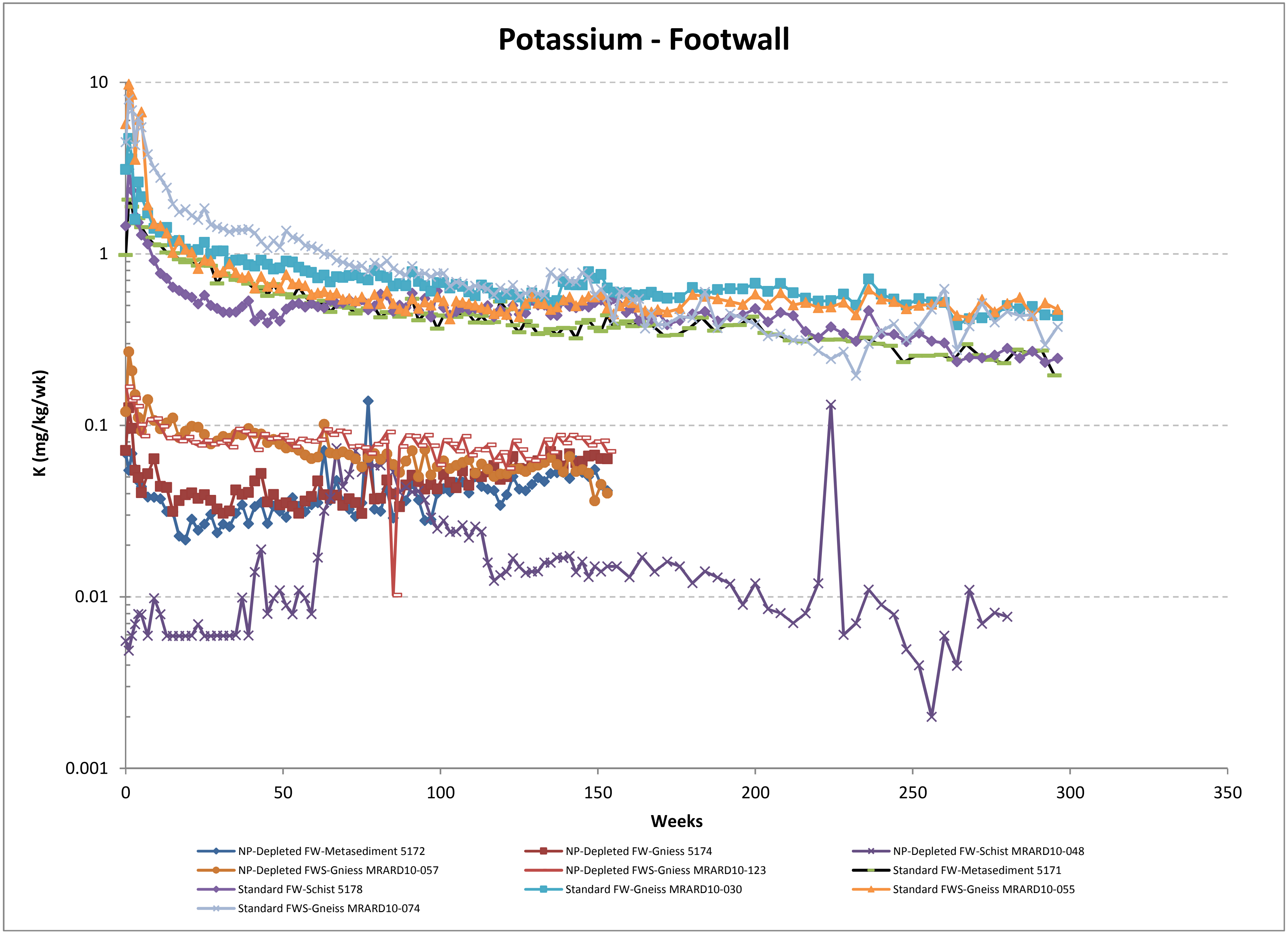
Iron - Hanging Wall
Fe (mg/kg/wk)
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



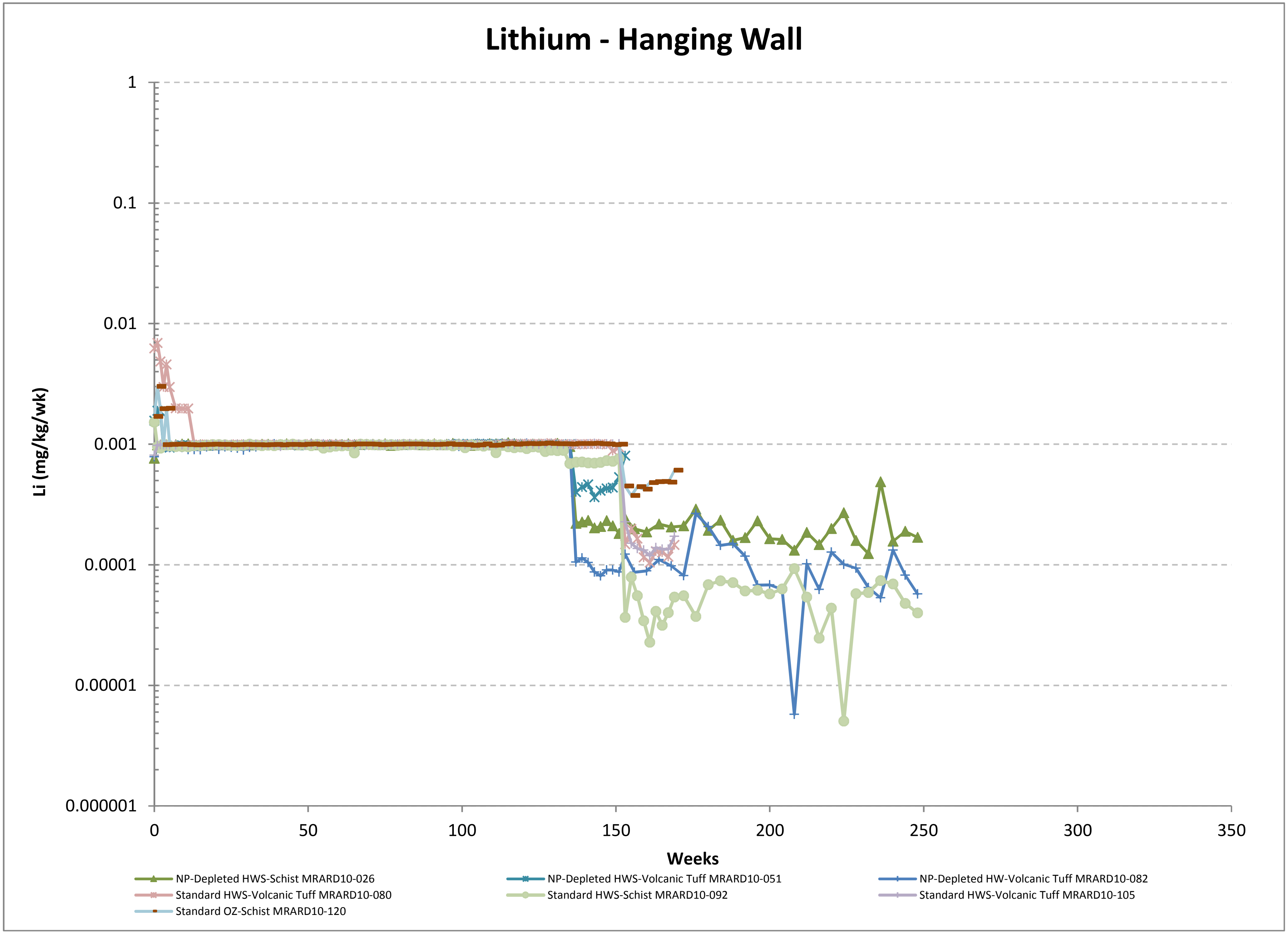
Iron - Footwall
Fe (mg/kg/wk)
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



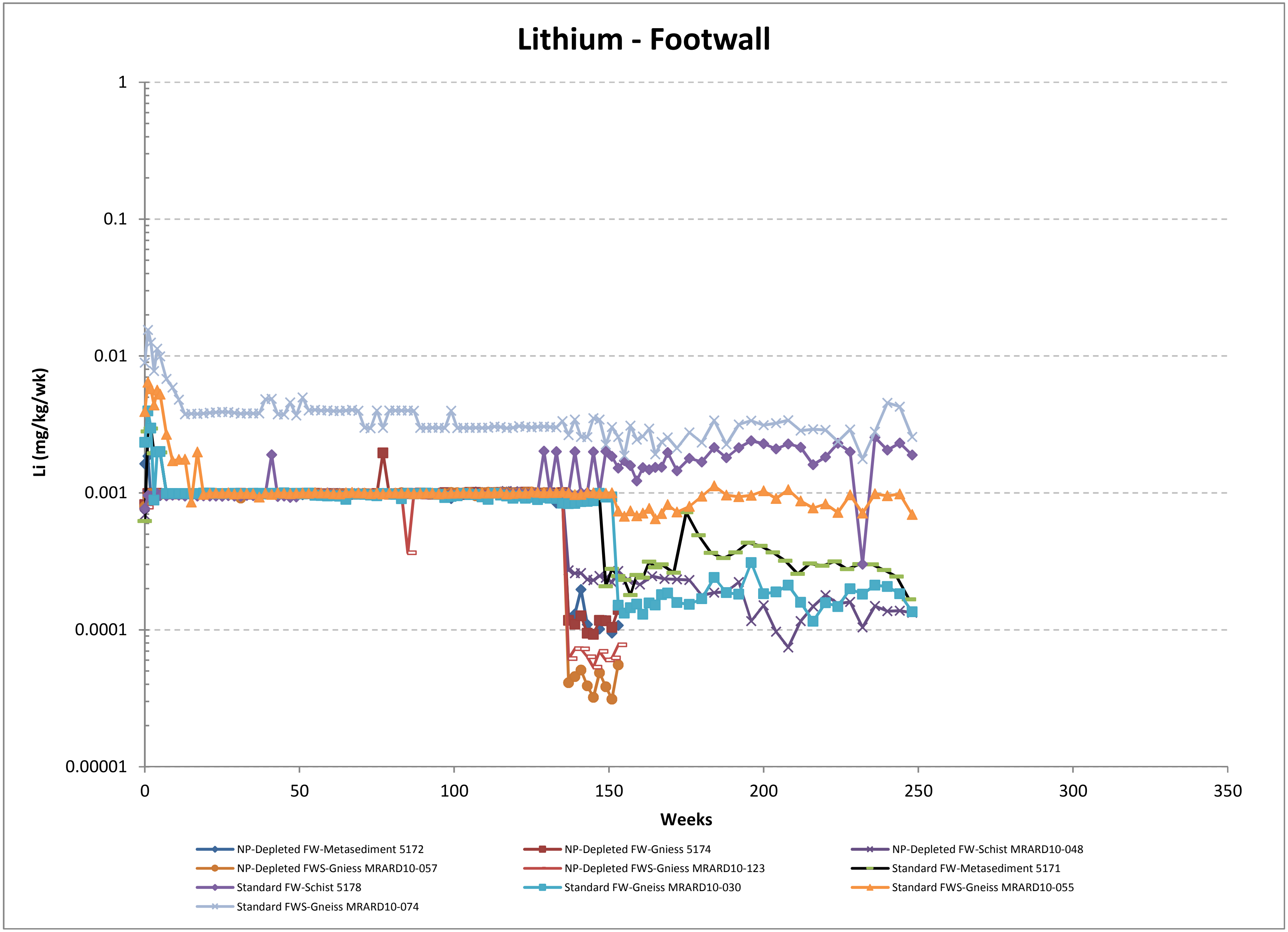
Potassium - Hanging Wall
K (mg/kg/wk)
100
10
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



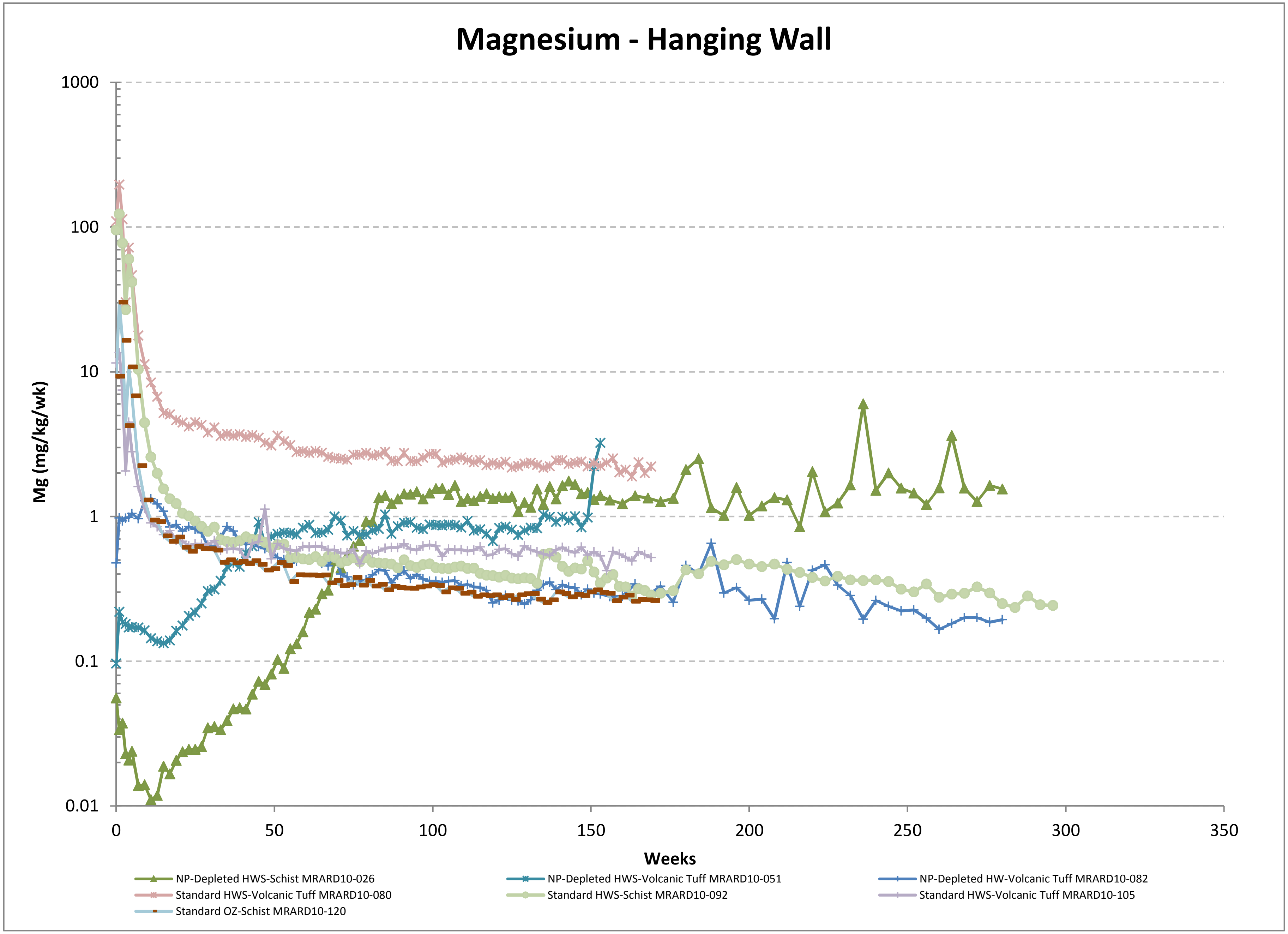
Potassium - Footwall
K (mg/kg/wk)
10
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



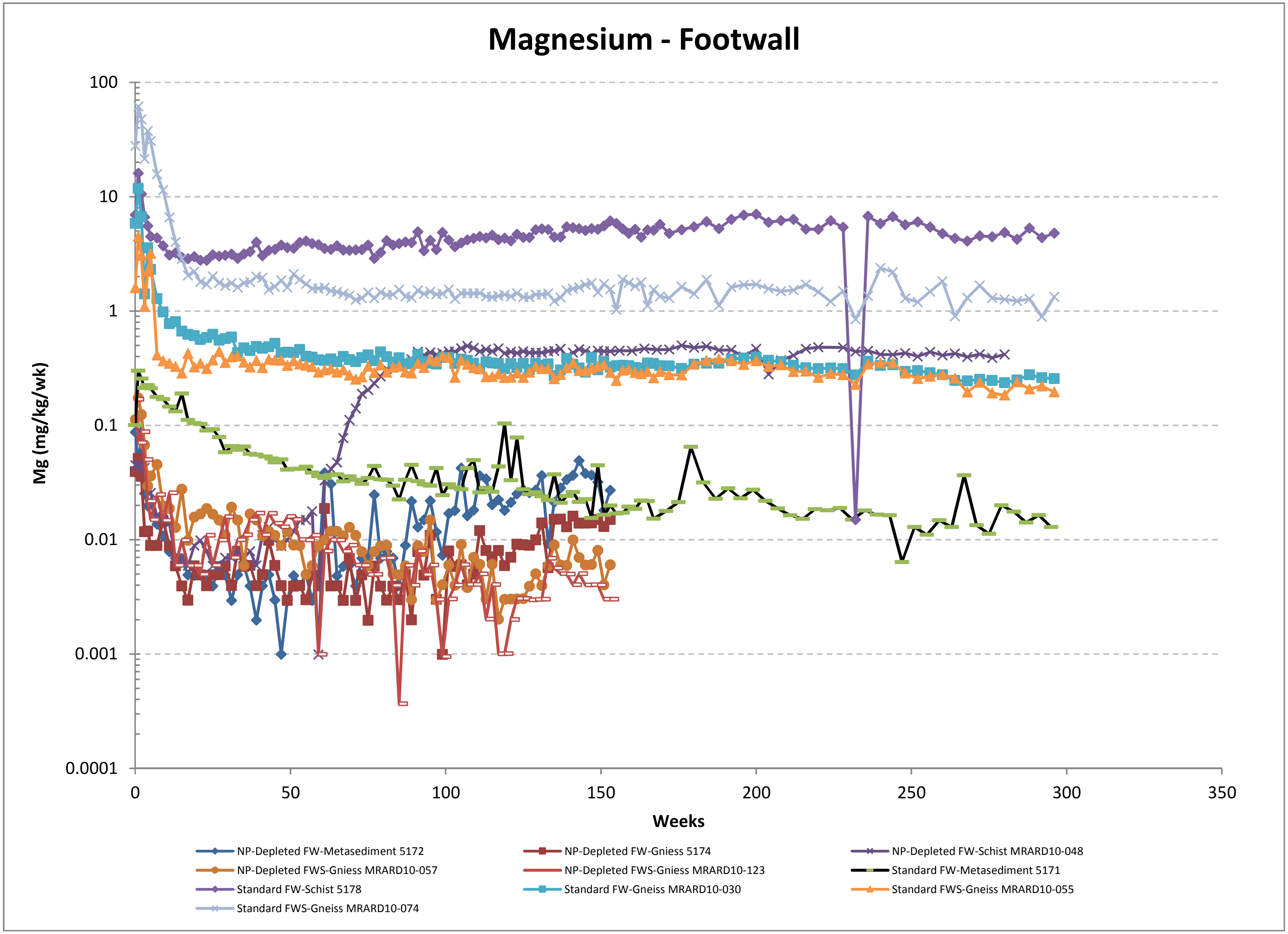
Lithium - Hanging Wall
Li (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



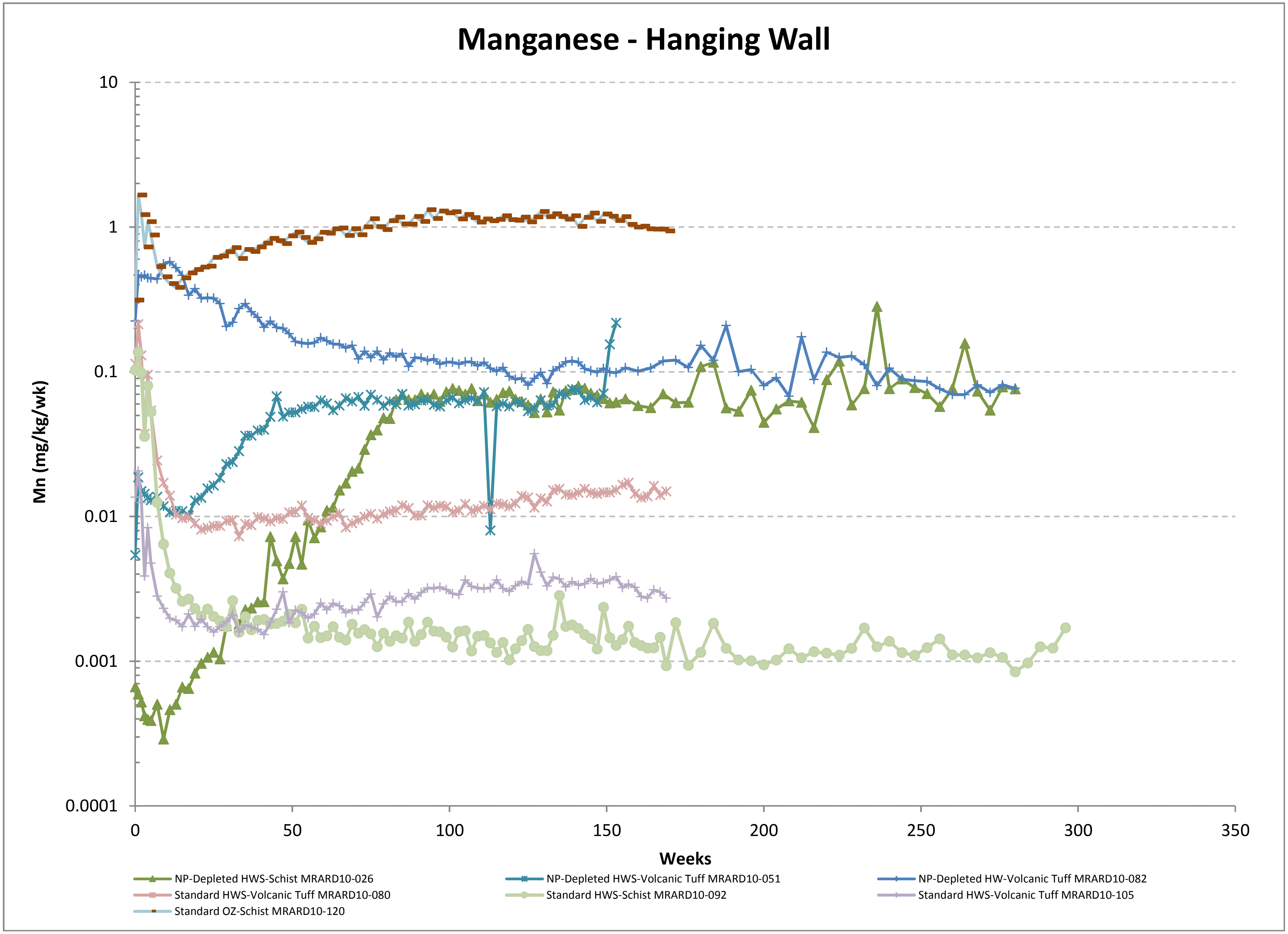
Lithium - Footwall
Li (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



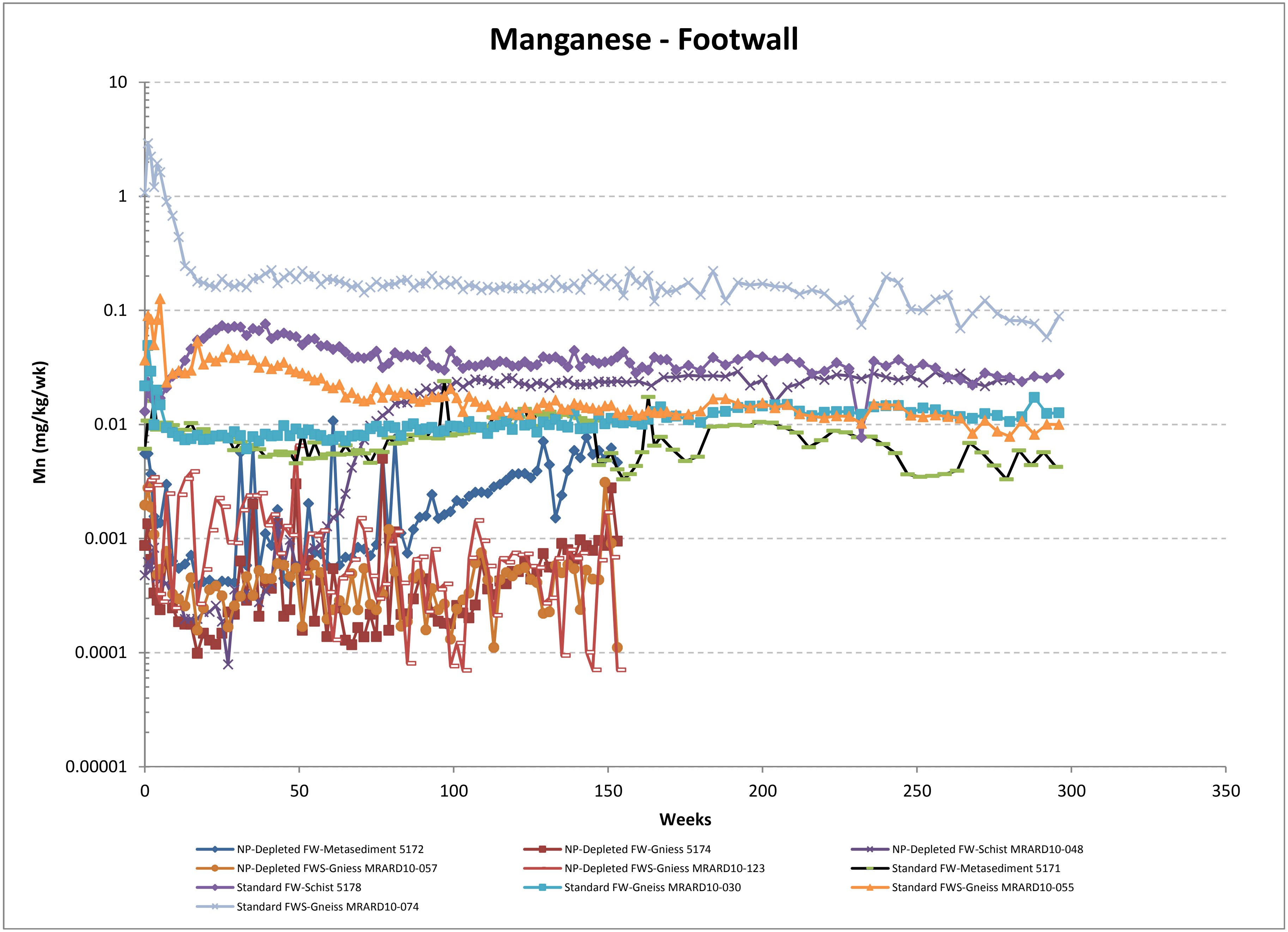
Magnesium - Hanging Wall
Mg (mg/kg/wk)
1000
100
10
1
0.1
0.01
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



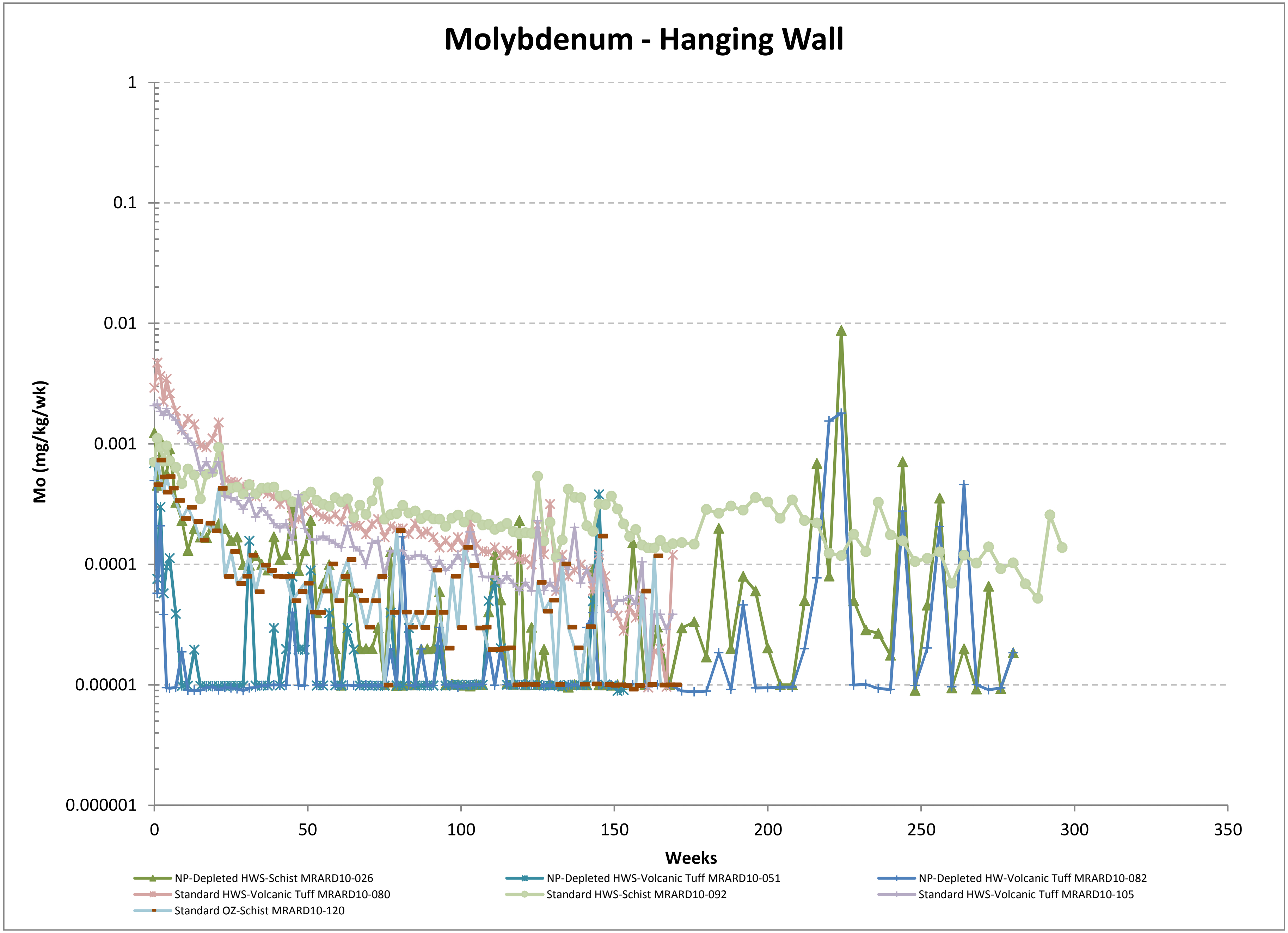
Magnesium - Footwall
Mg (mg/kg/wk)
100
10
1
0.1
0.01
0.001
0.0001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



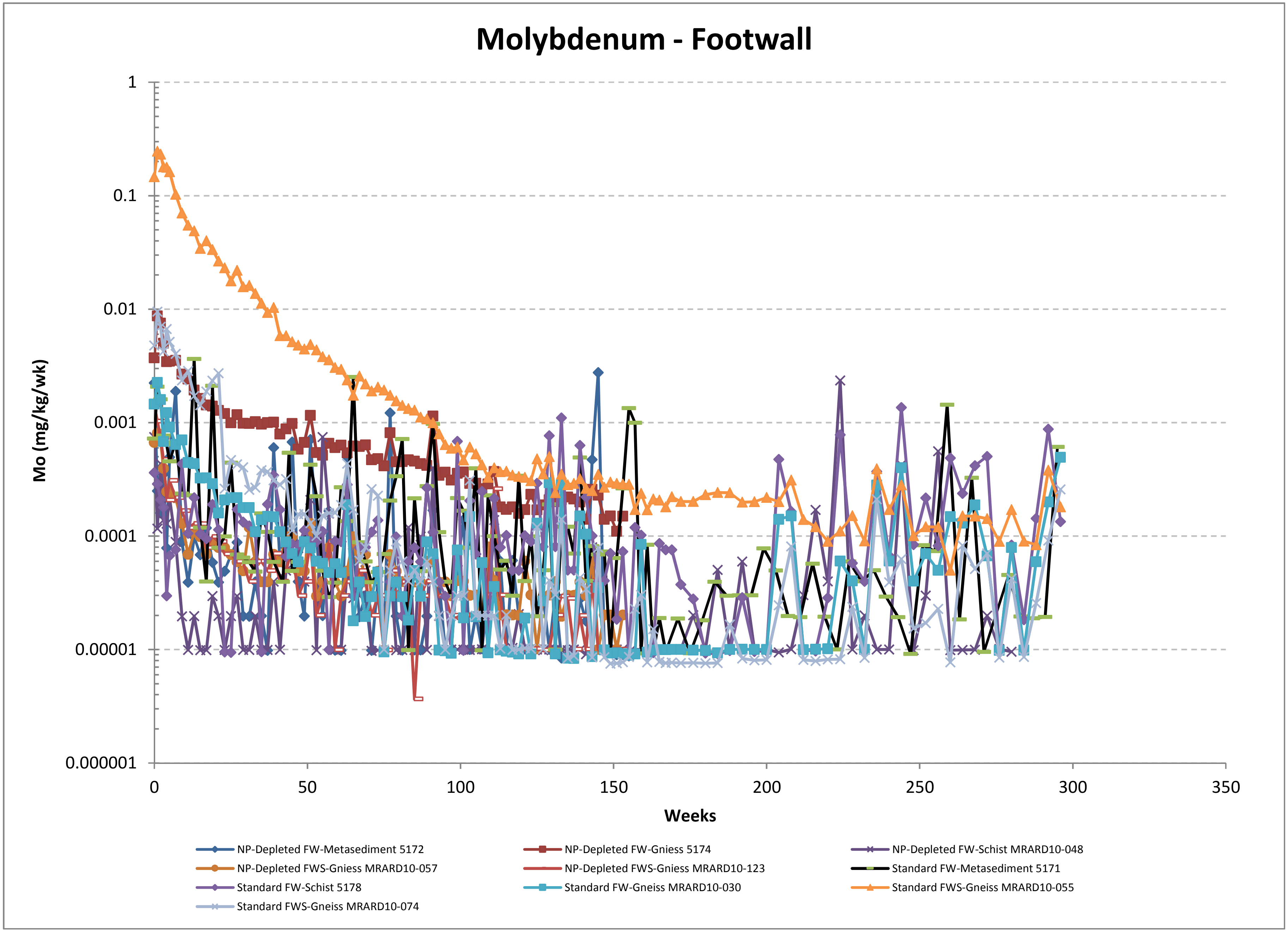
Manganese - Hanging Wall
Mn (mg/kg/wk)
10
1
0.1
0.01
0.001
0.0001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



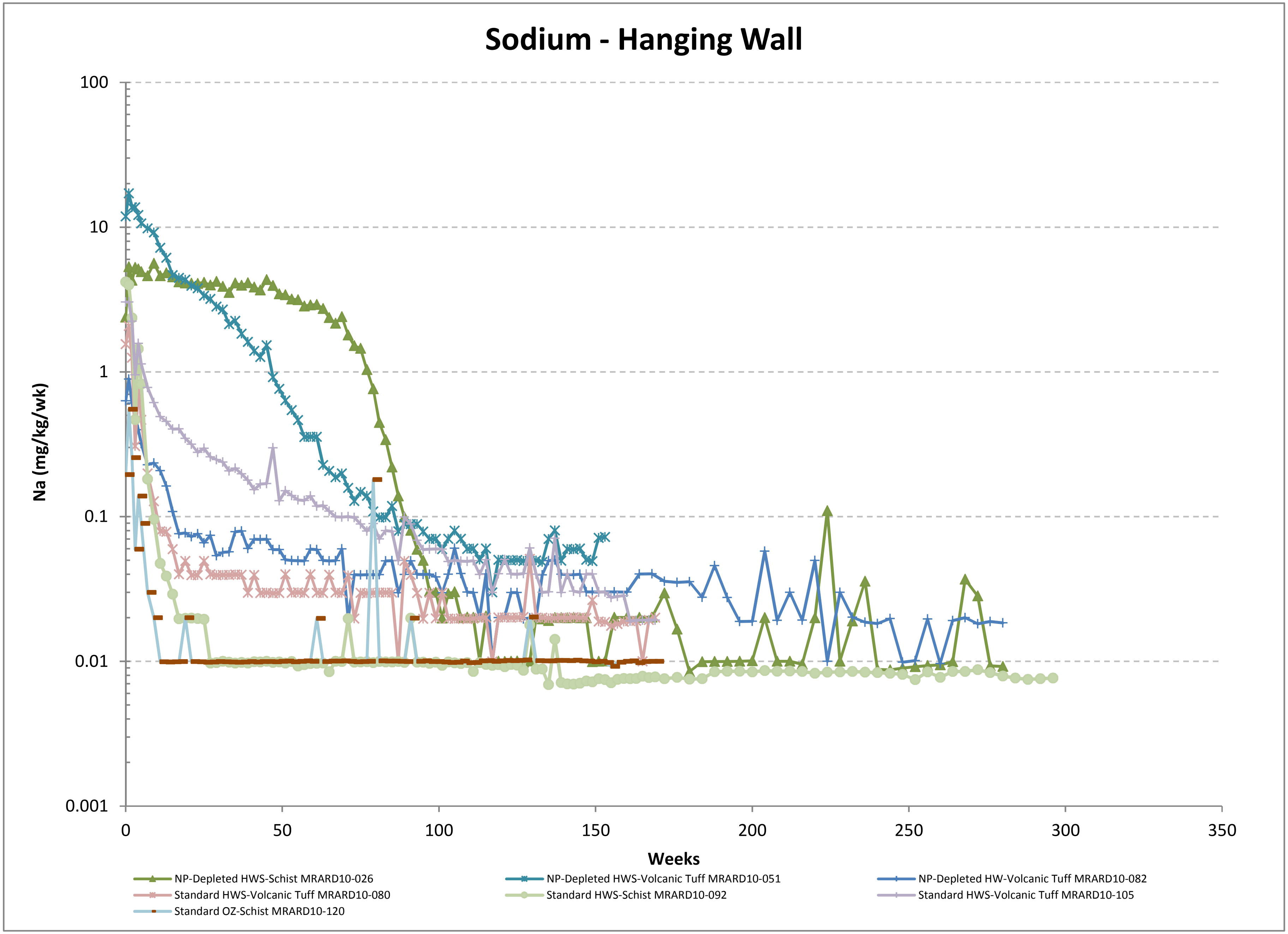
Manganese - Footwall
Mn (mg/kg/wk)
10
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



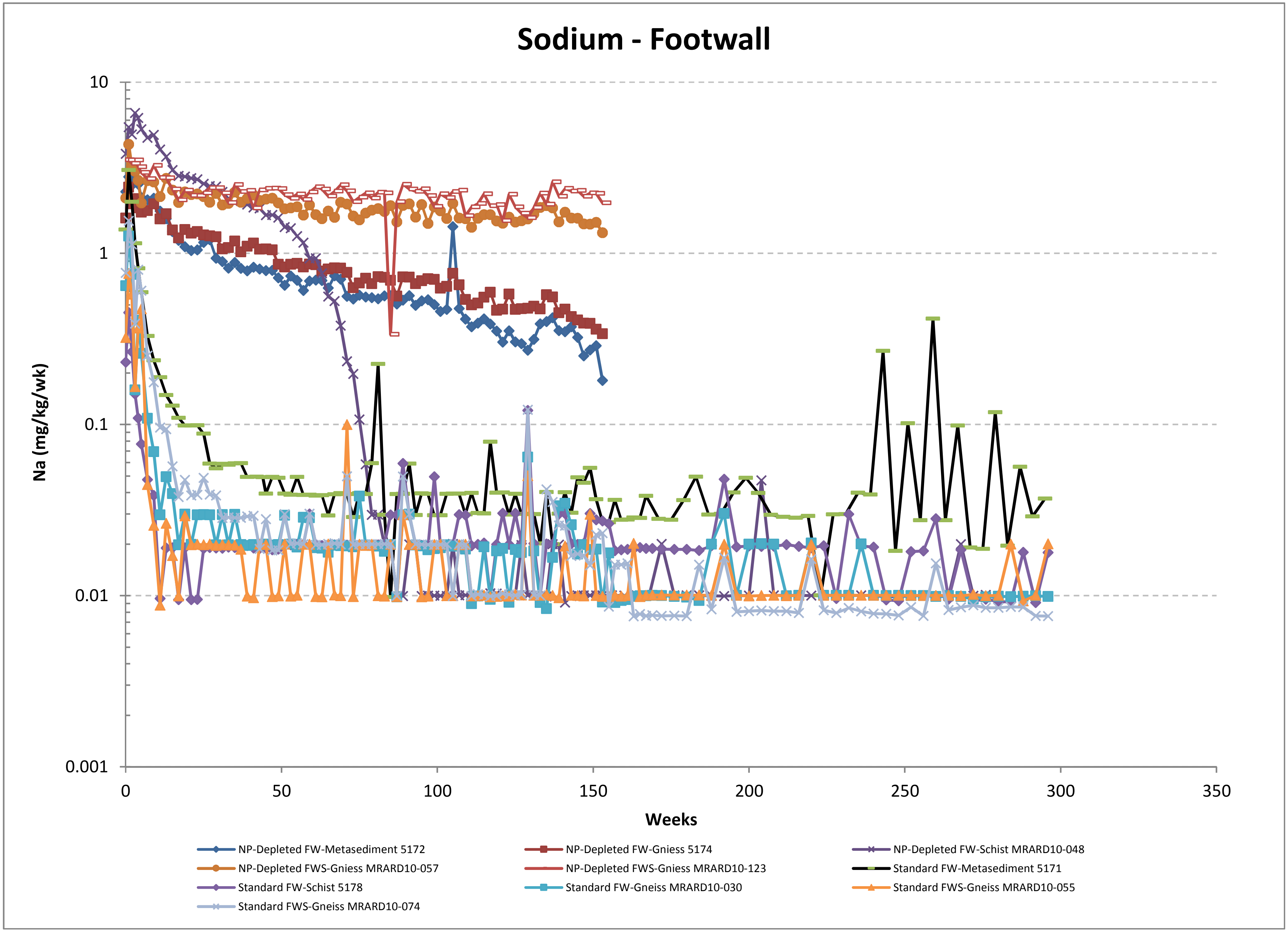
Molybdenum - Hanging Wall
Mo (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



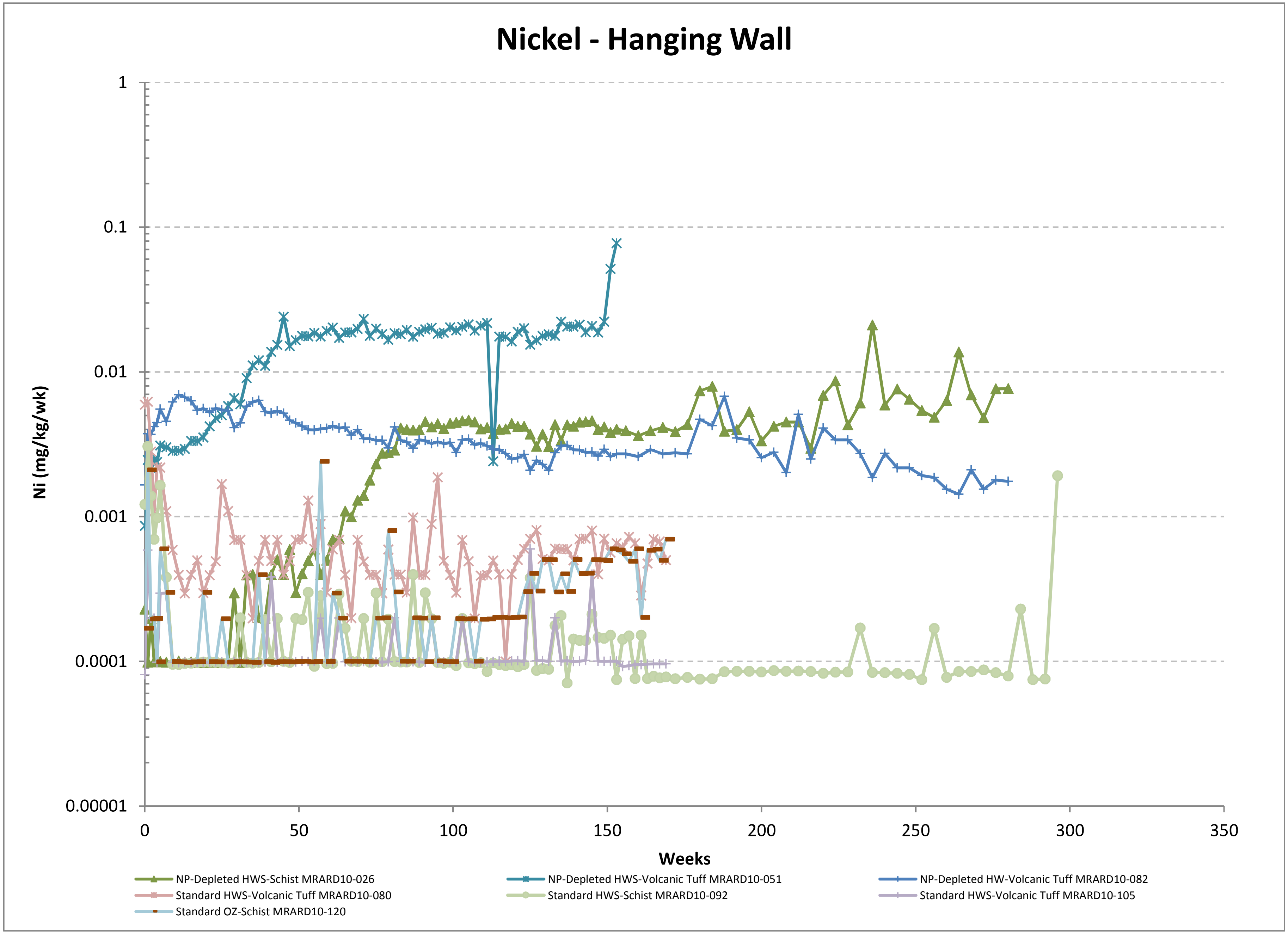
Molybdenum - Footwall
Mo (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



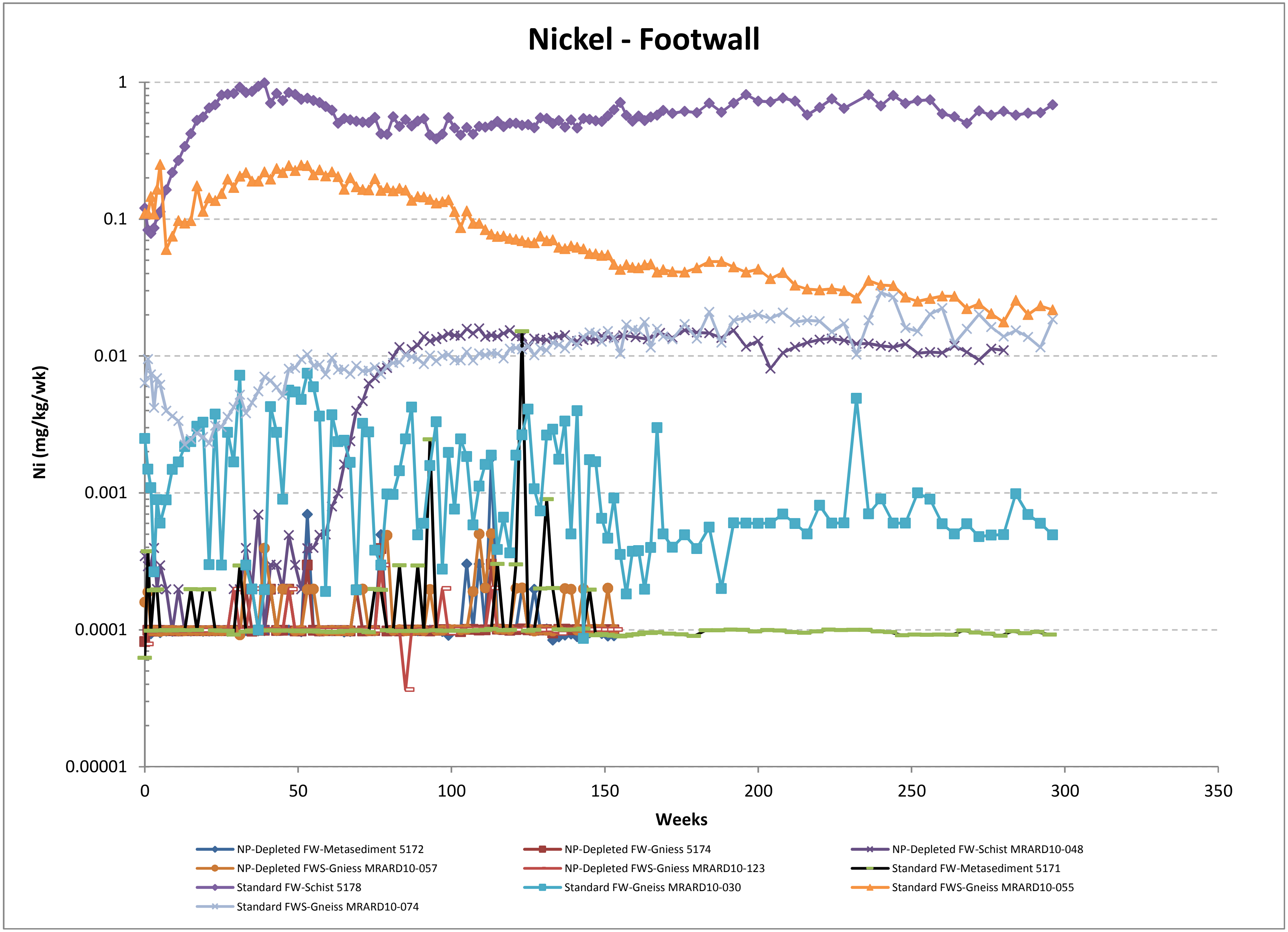
Sodium - Hanging Wall
Na (mg/kg/wk)
100
10
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

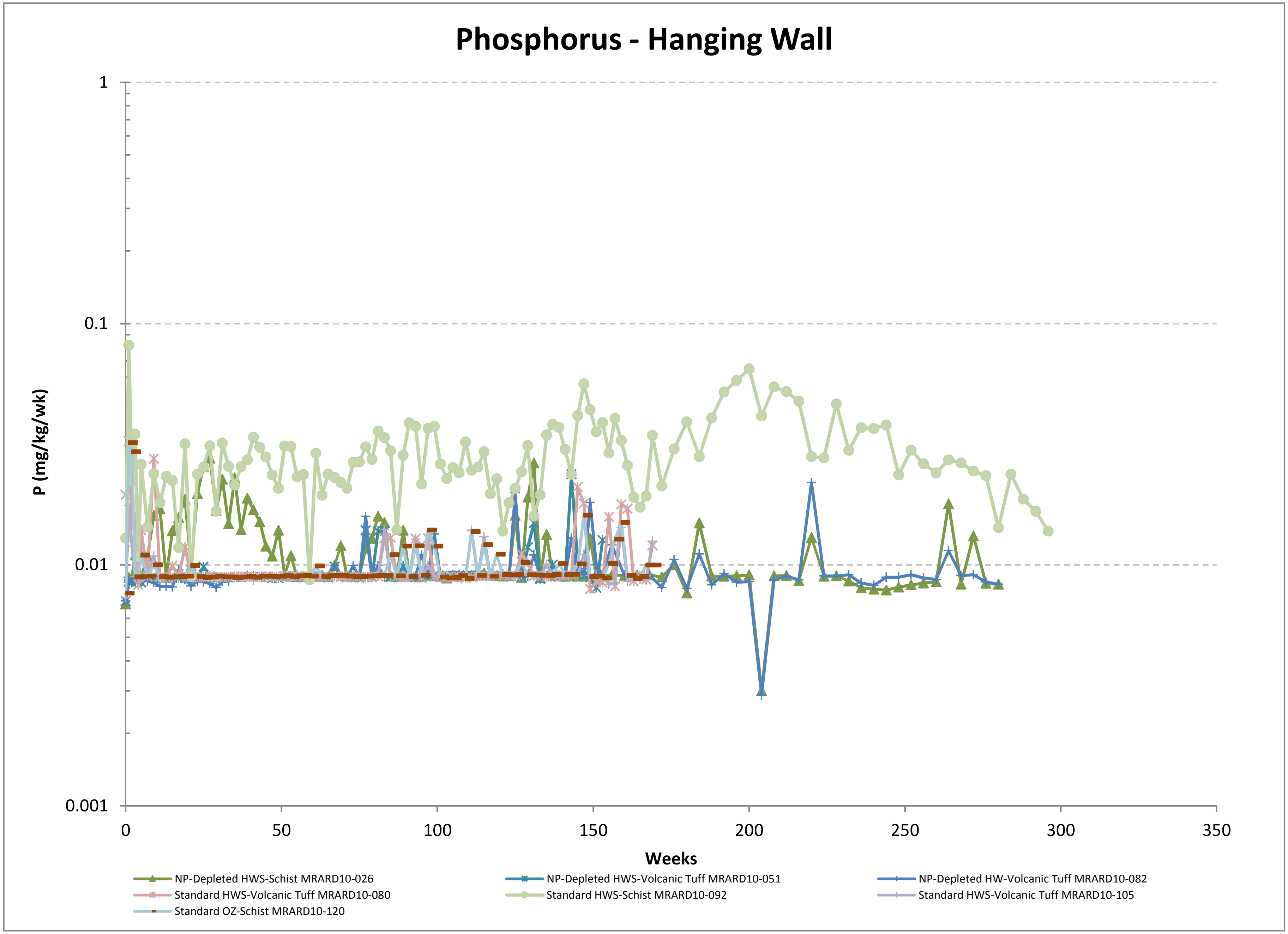


Sodium - Footwall
Na (mg/kg/wk)
10
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

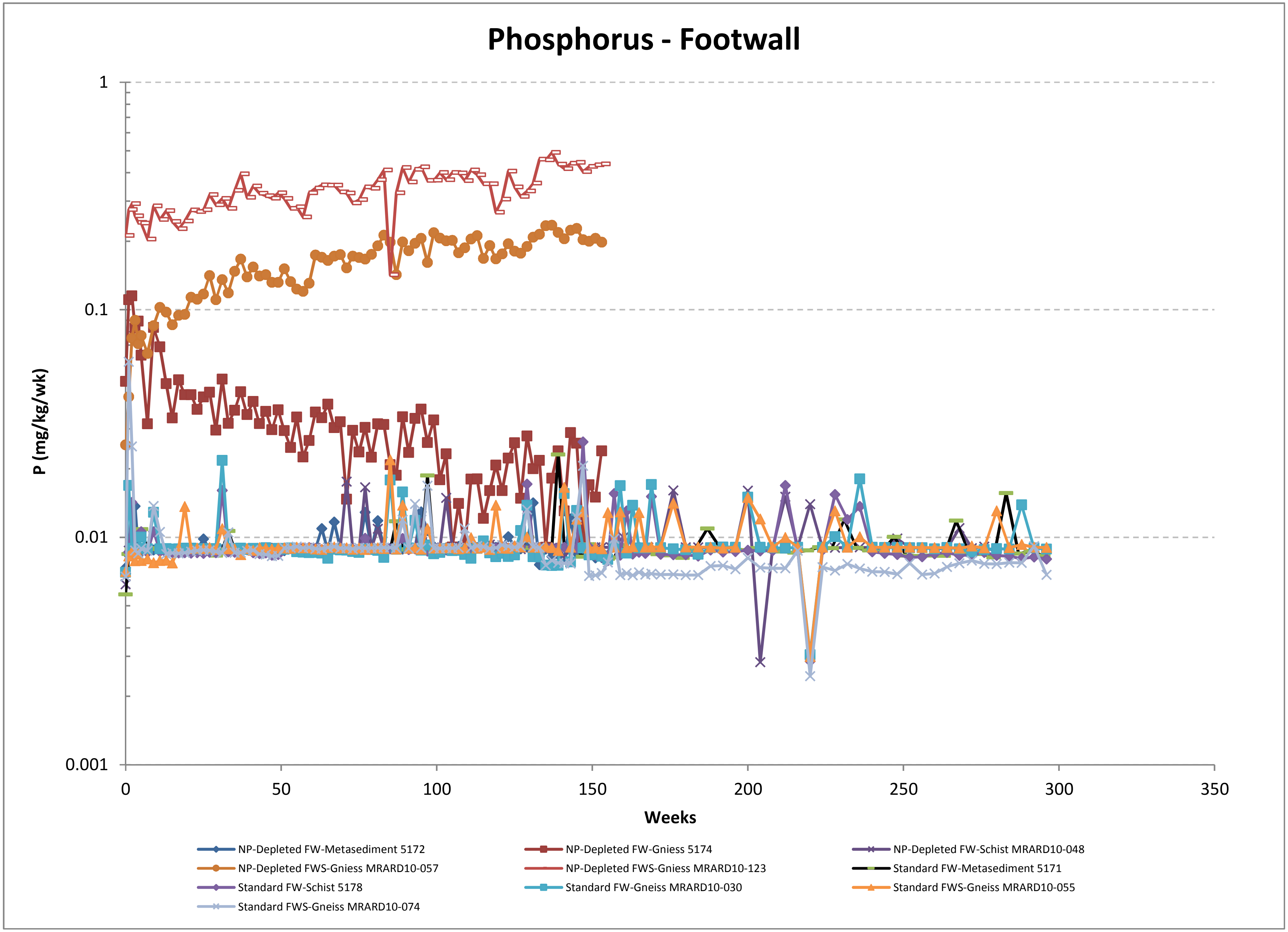


Nickel - Hanging Wall
Ni (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

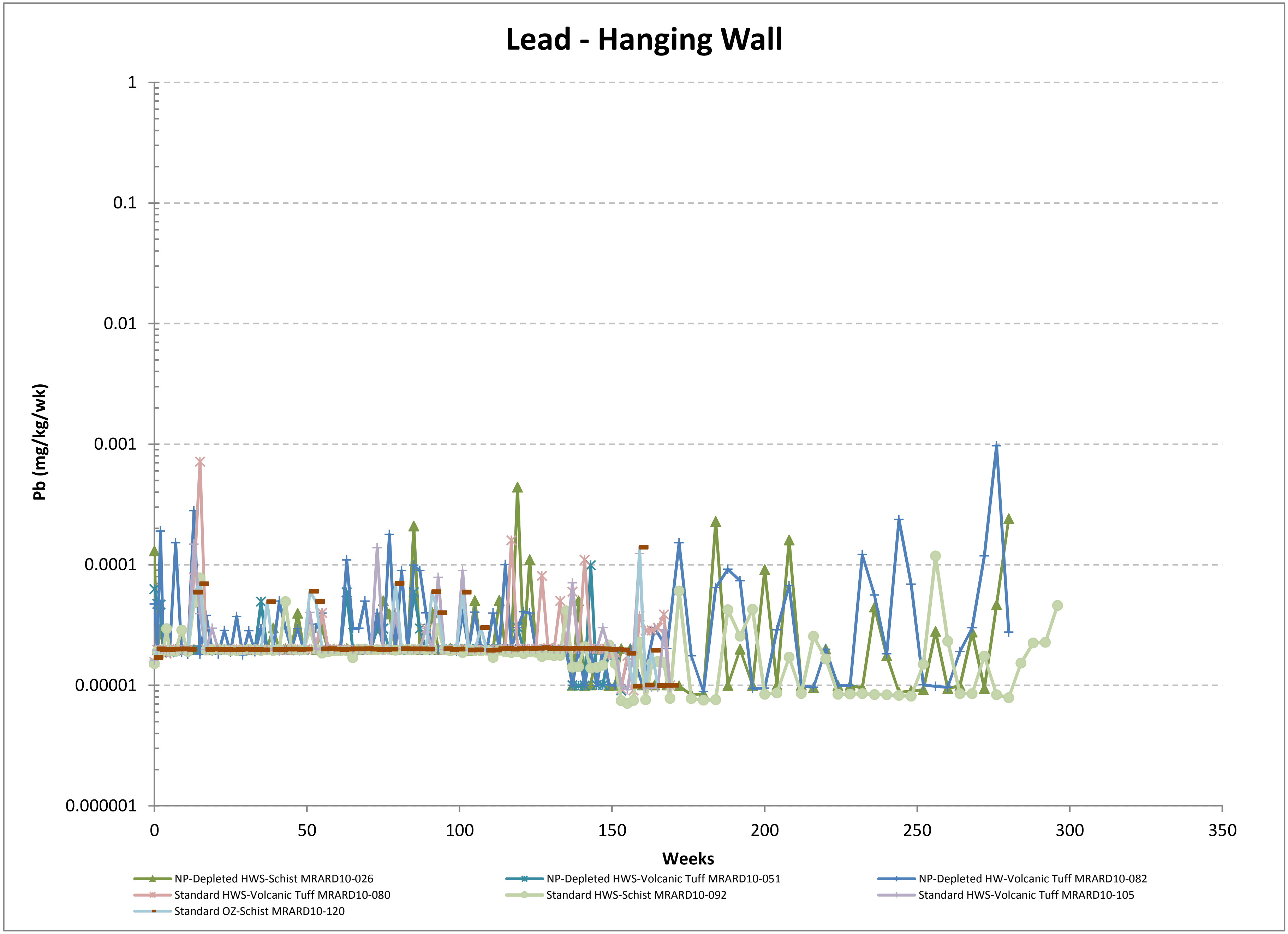

Nickel - Footwall
Ni (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



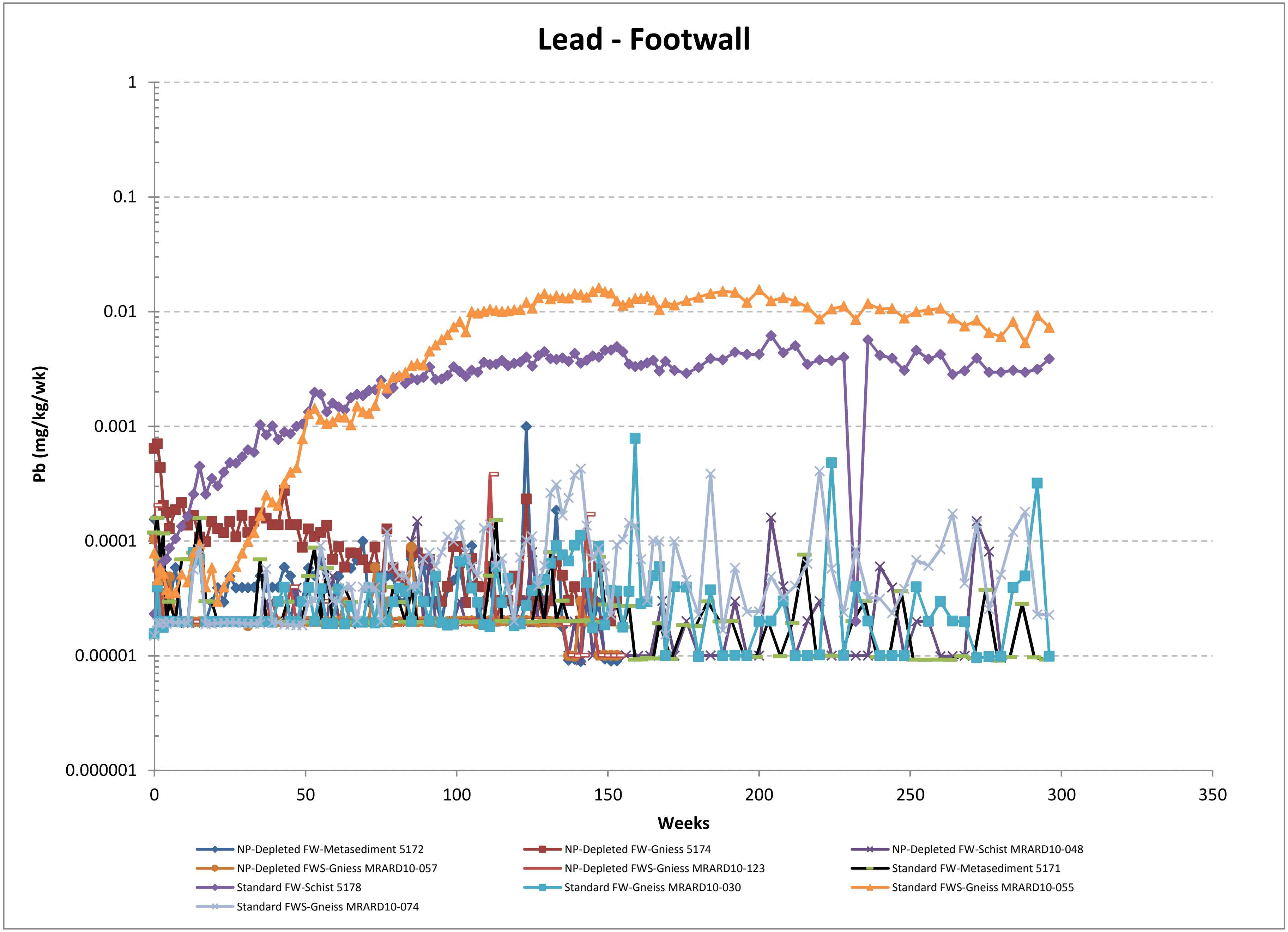
Phosphorus - Hanging Wall
P (mg/kg/wk)
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



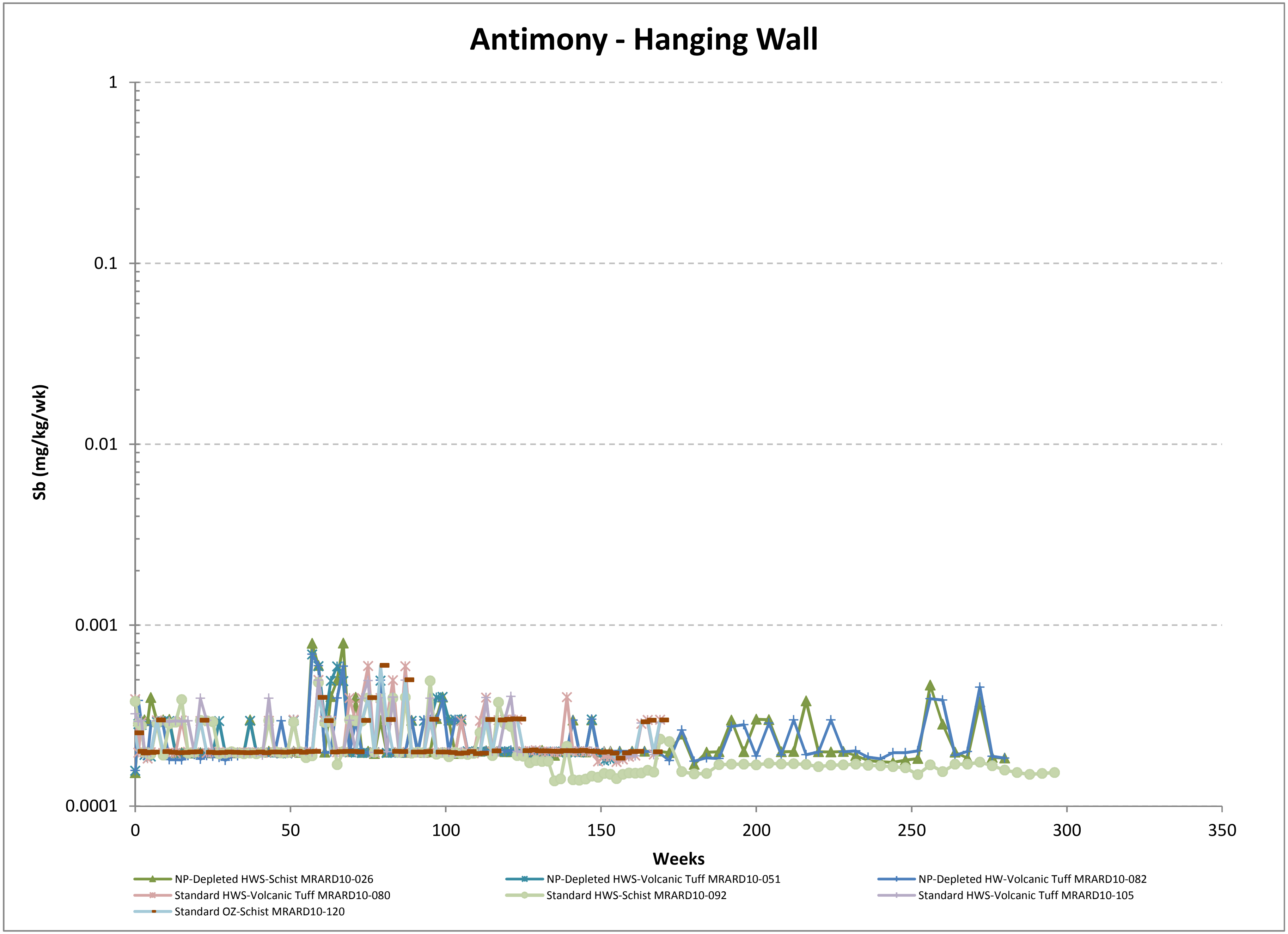
Phosphorus - Footwall
P (mg/kg/wk)
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



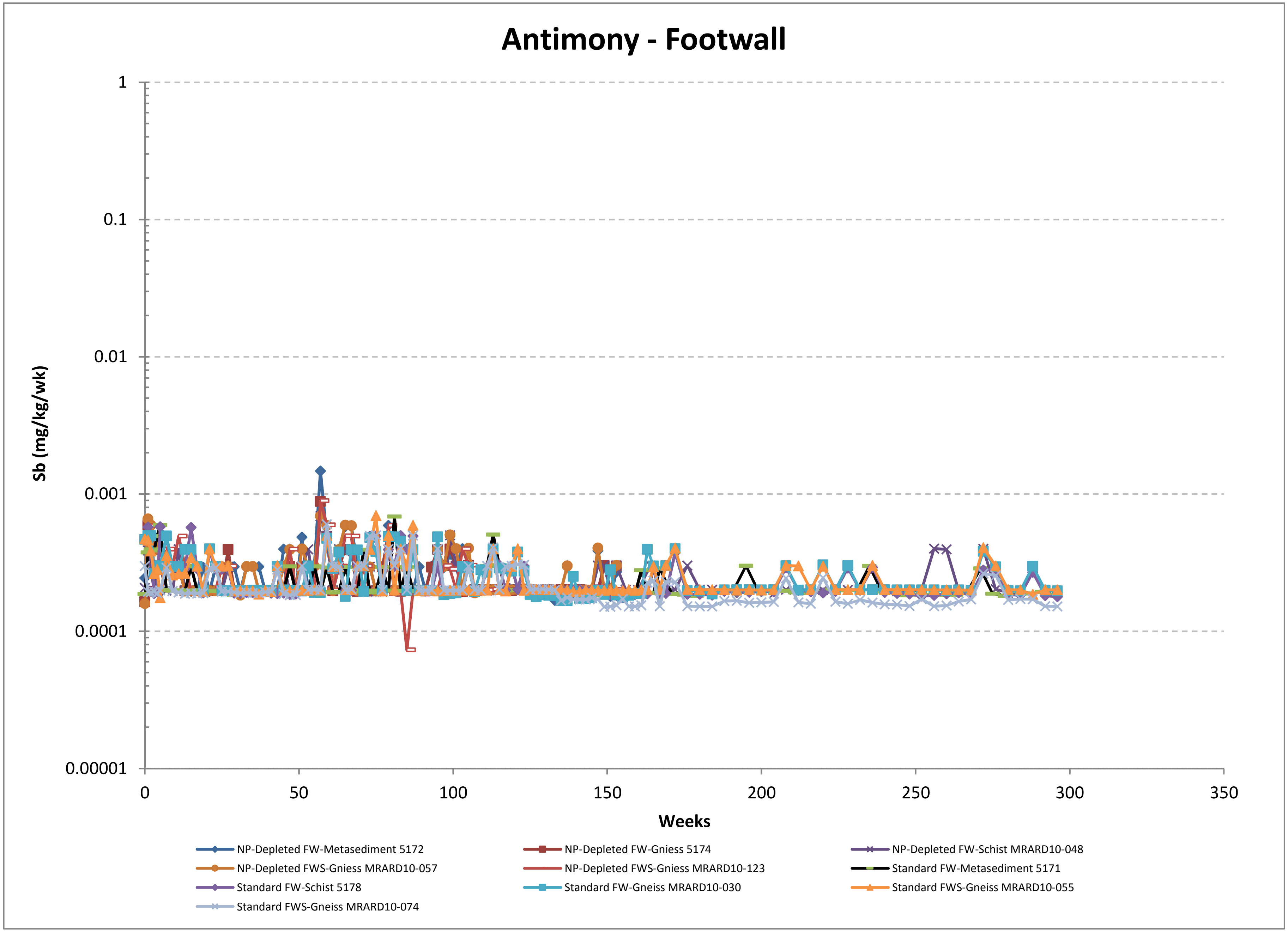
Lead - Hanging Wall
Pb (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

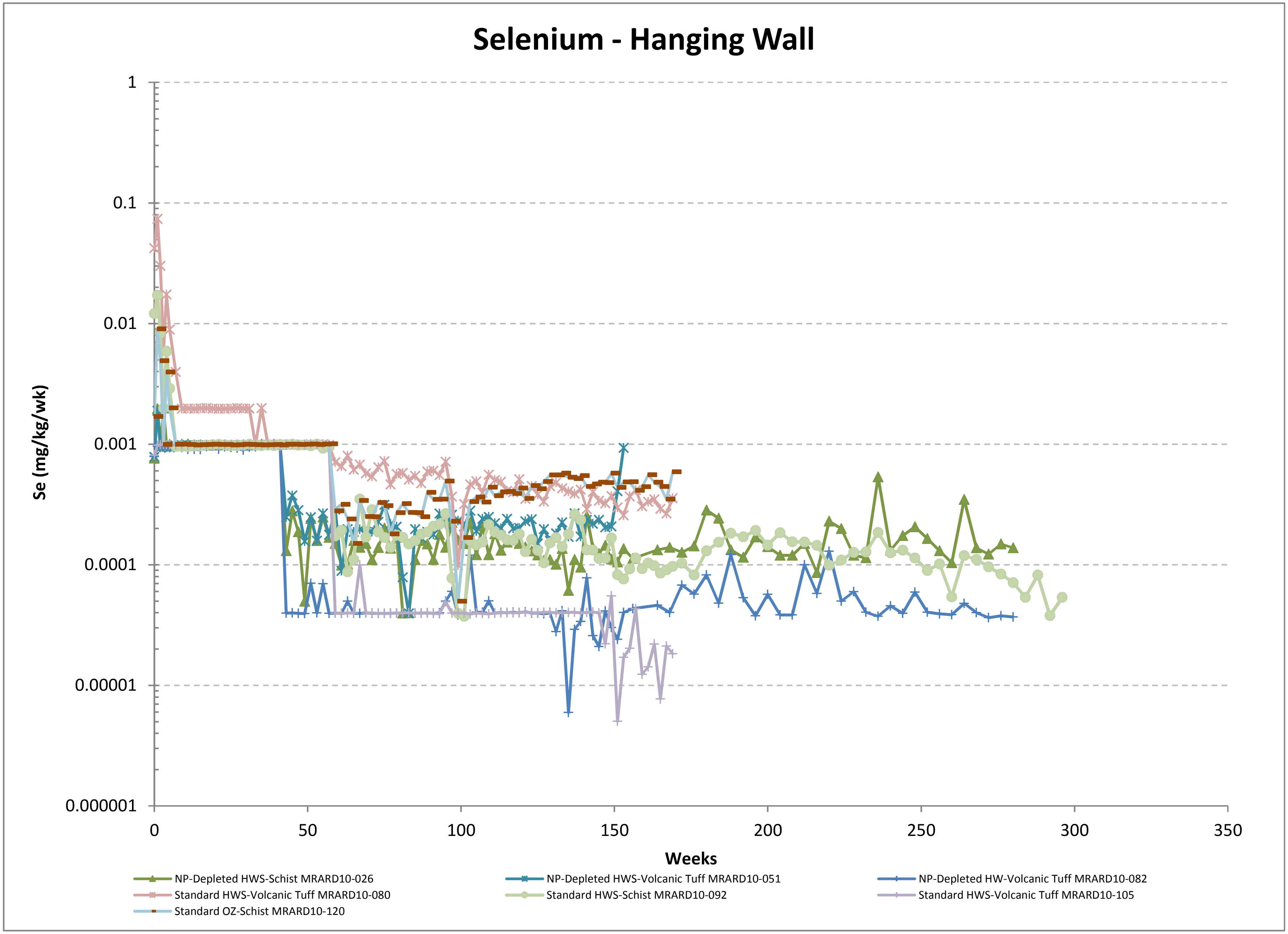


Lead - Footwall
Pb (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

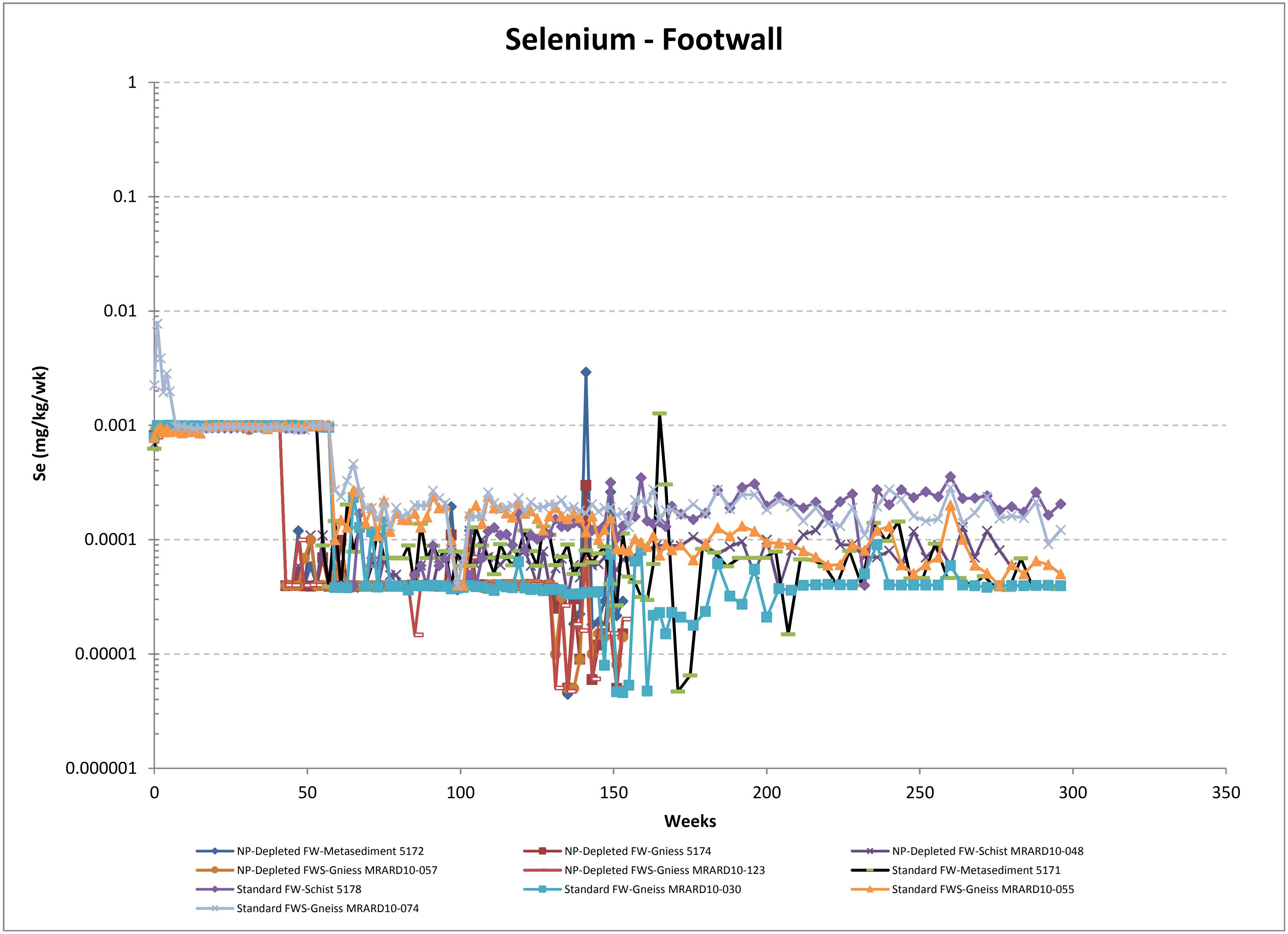


Antimony - Hanging Wall
Sb (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

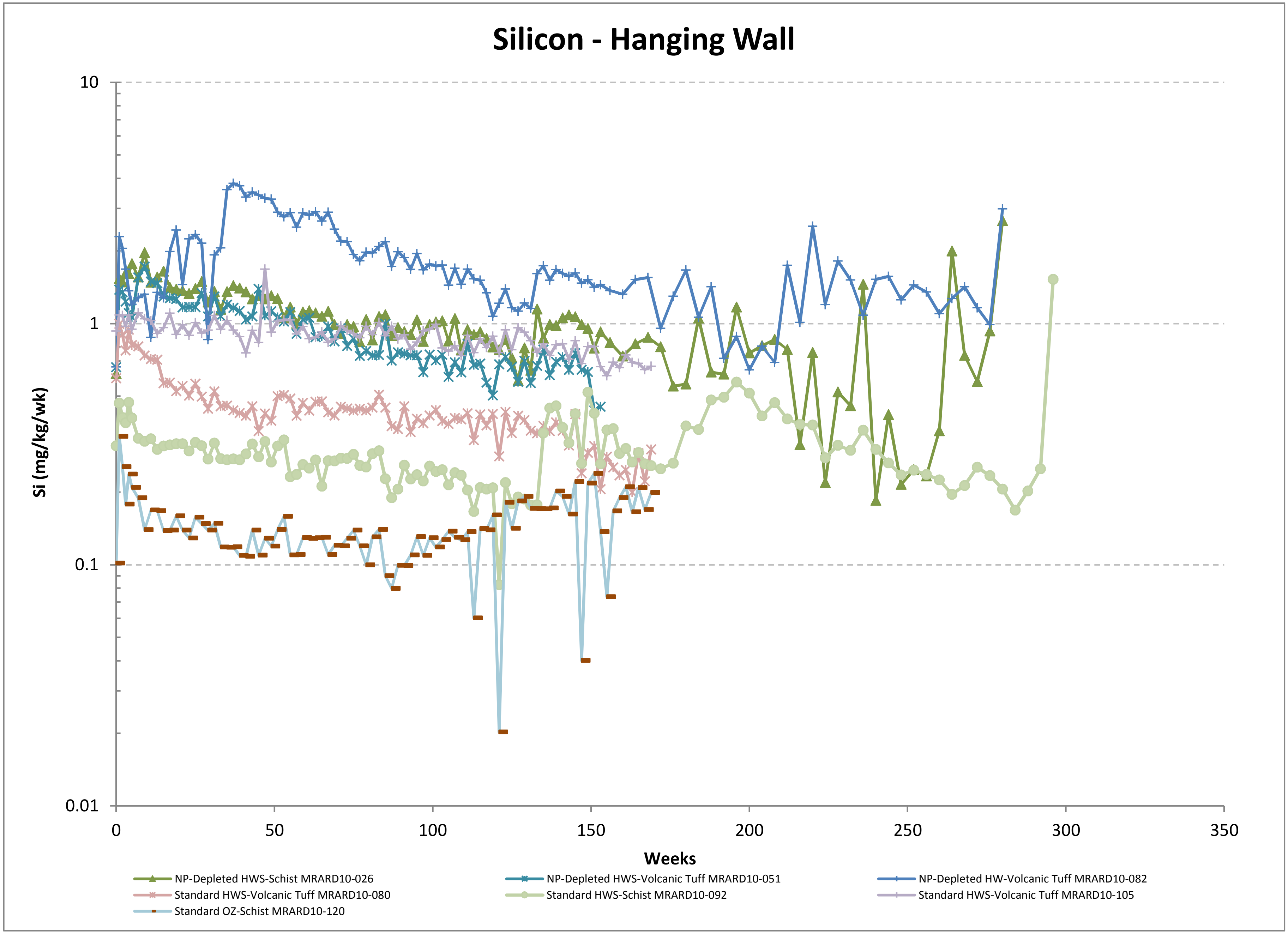

Antimony - Footwall
Sb (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



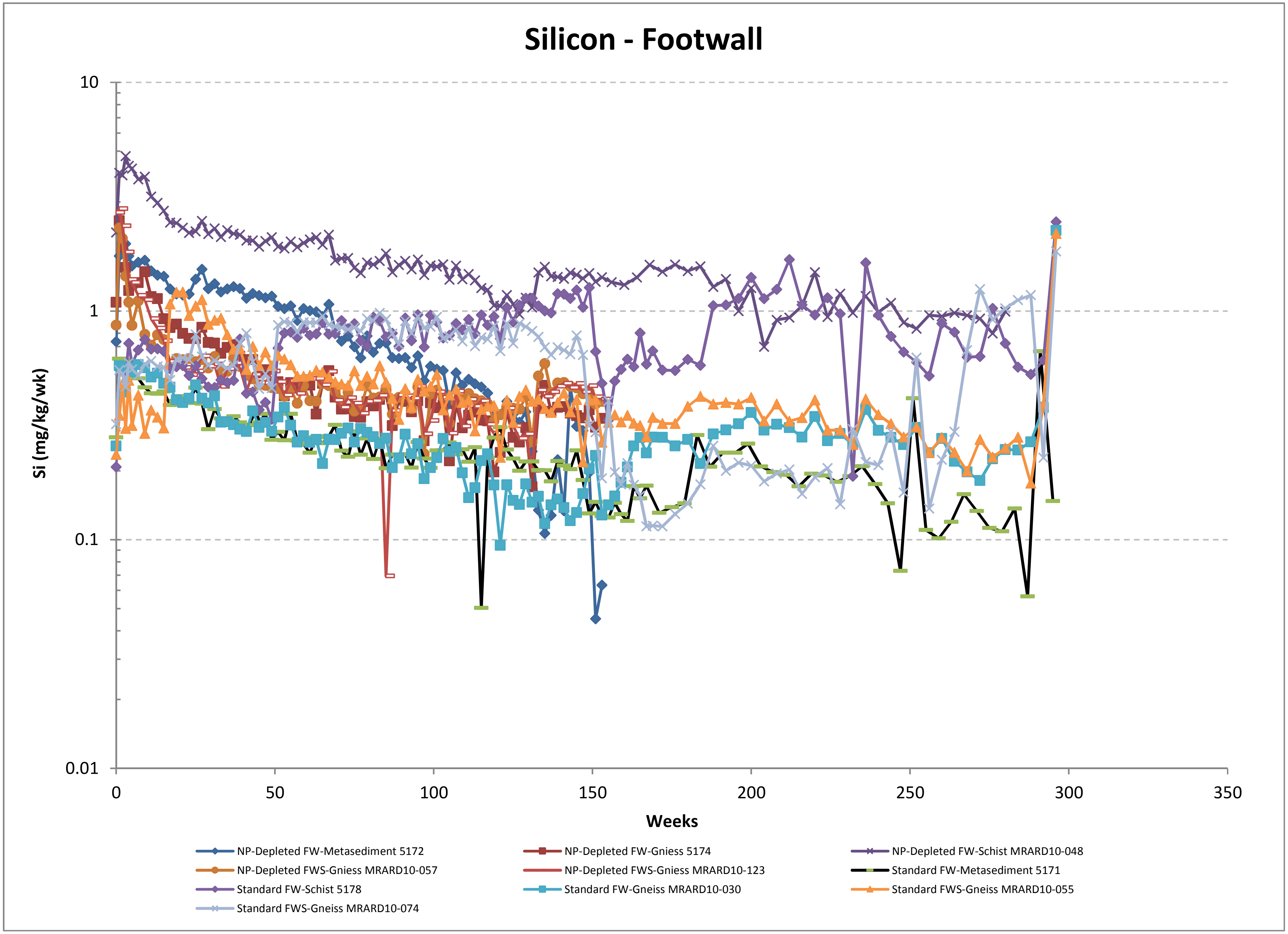
Selenium - Hanging Wall
Se (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



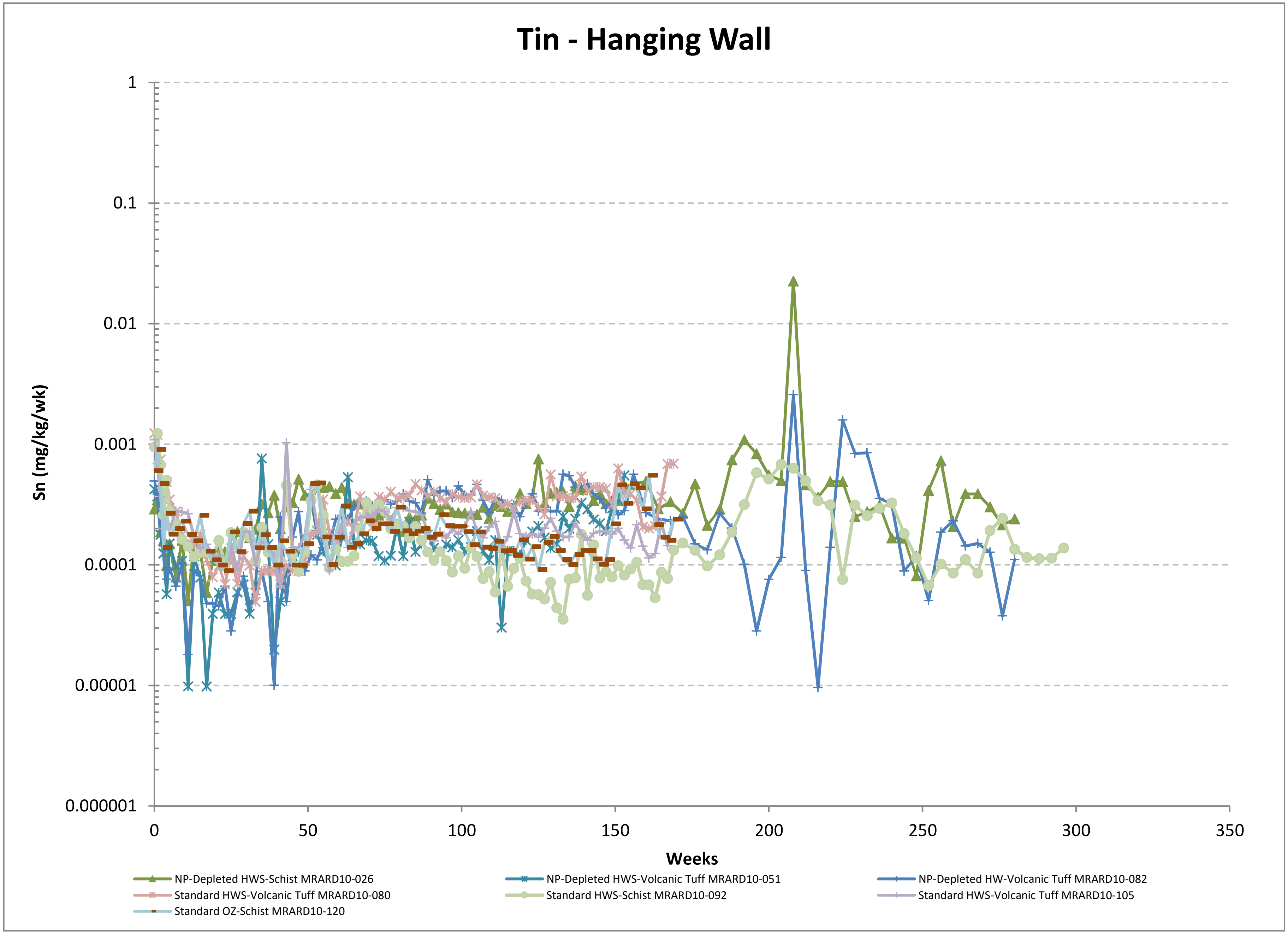
Selenium - Footwall
Se (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

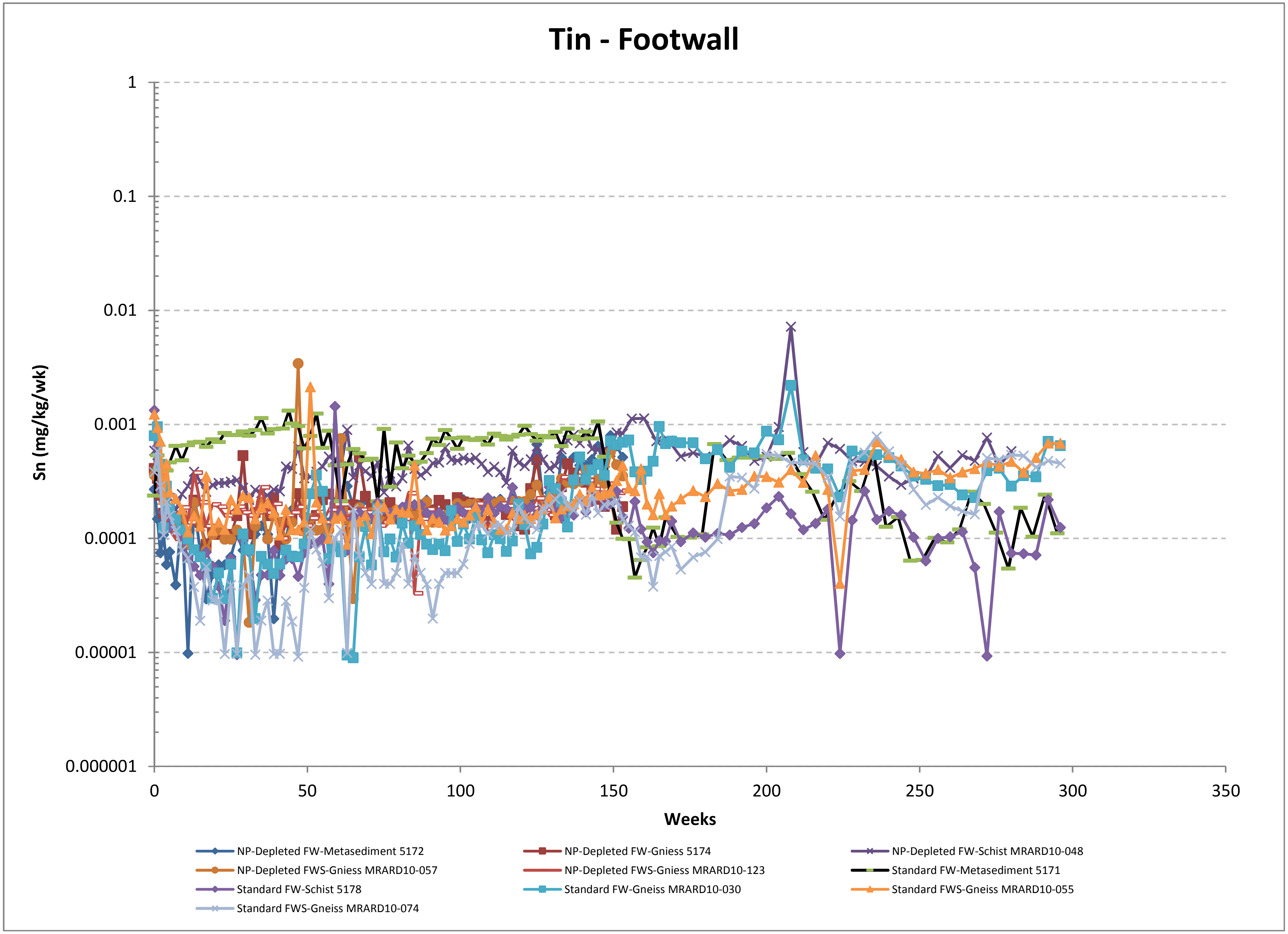


Silicon - Hanging Wall
Si (mg/kg/wk)
10
1
0.1
0.01
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

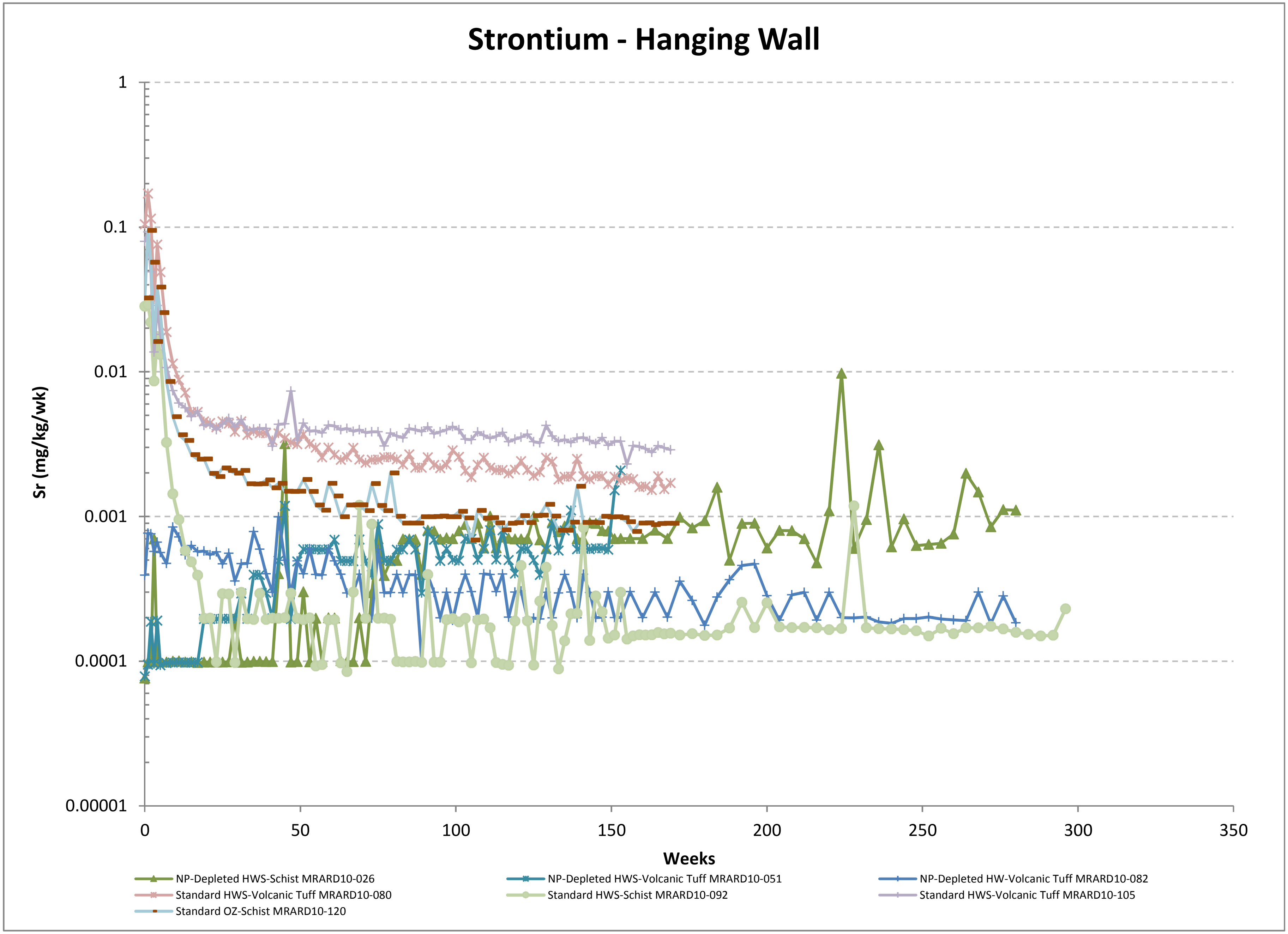


Silicon - Footwall
Si (mg/kg/wk)
10
1
0.1
0.01
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

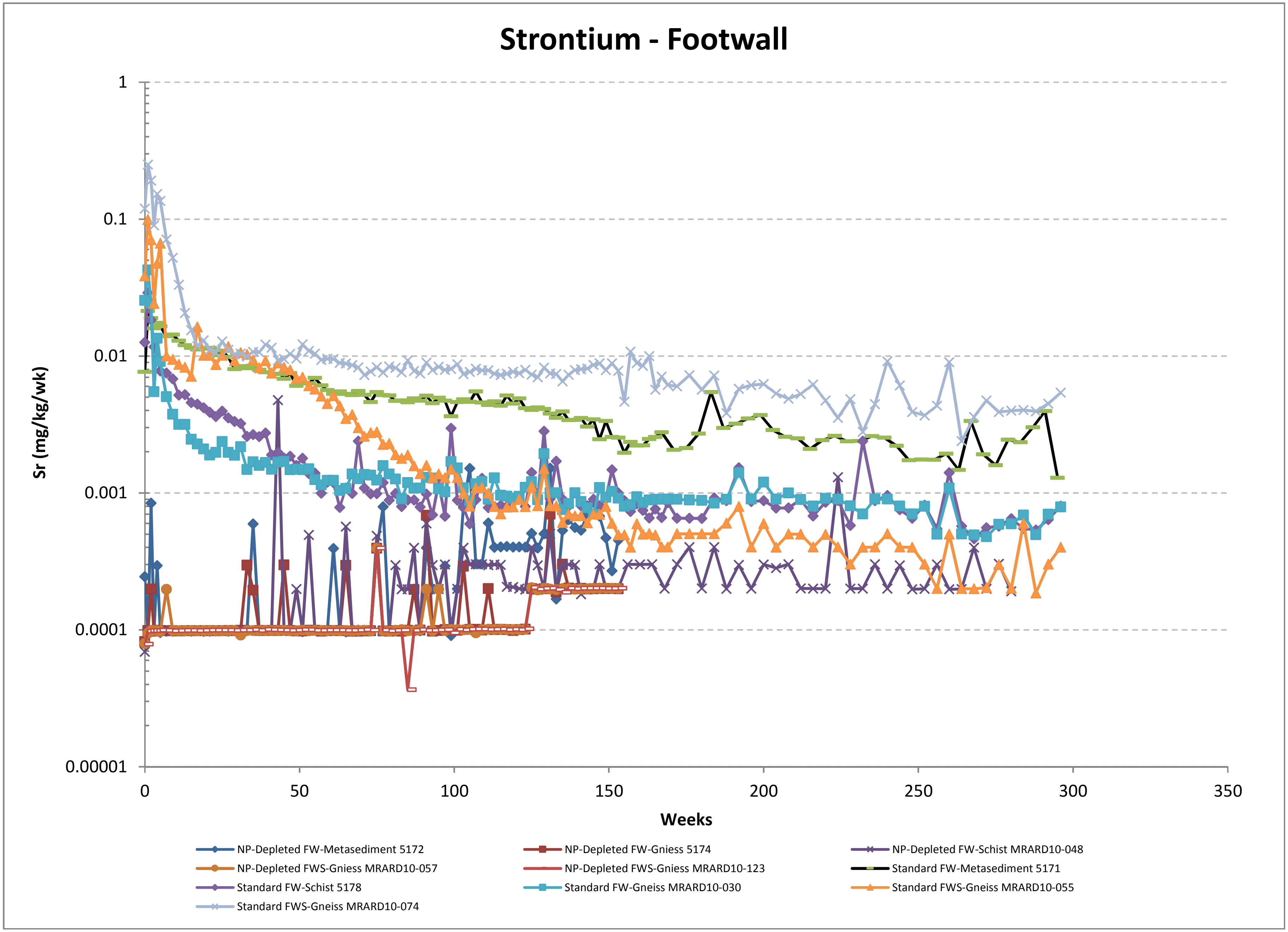

Tin - Hanging Wall
Sn (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



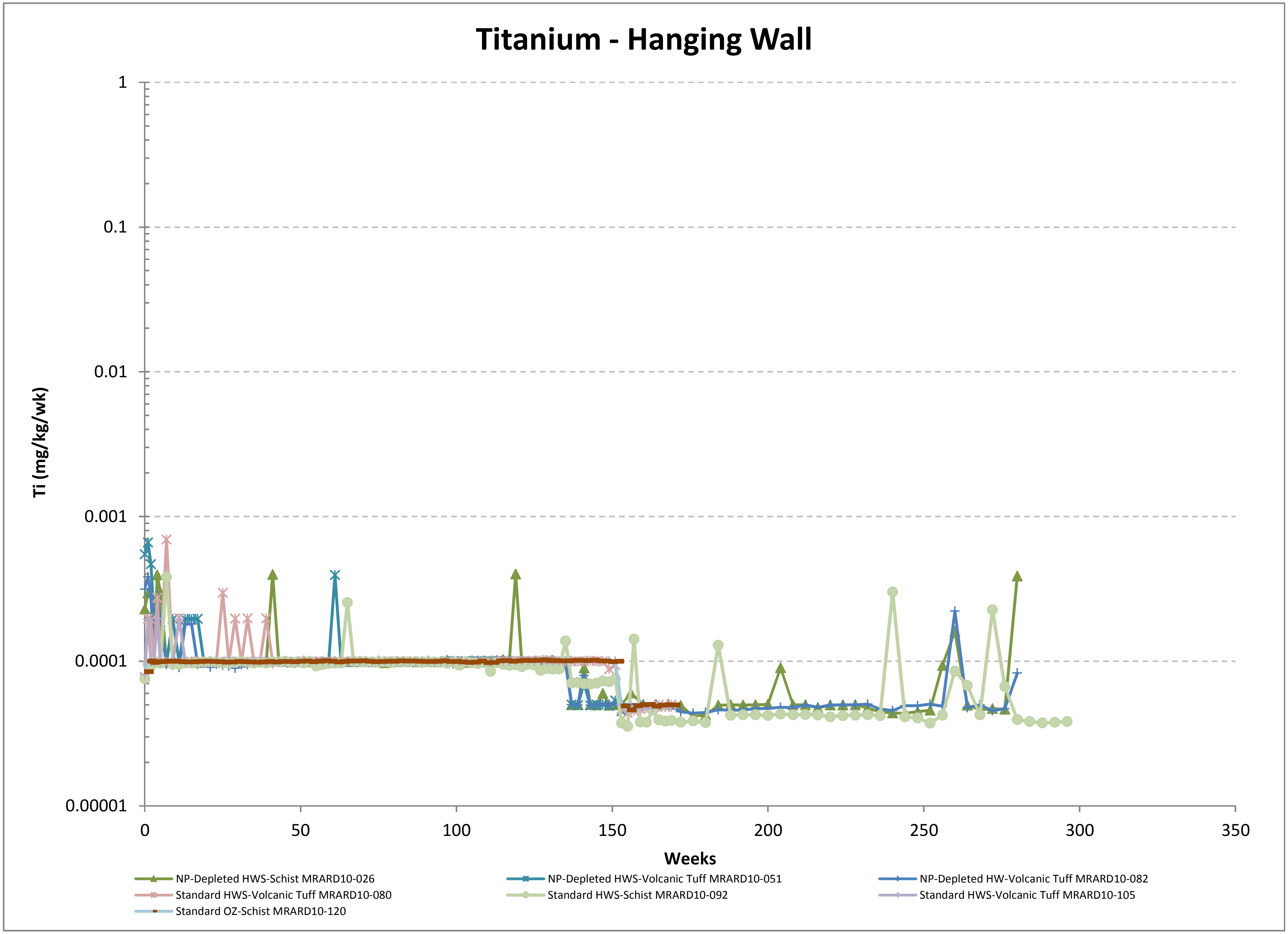
Tin - Footwall
Sn (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



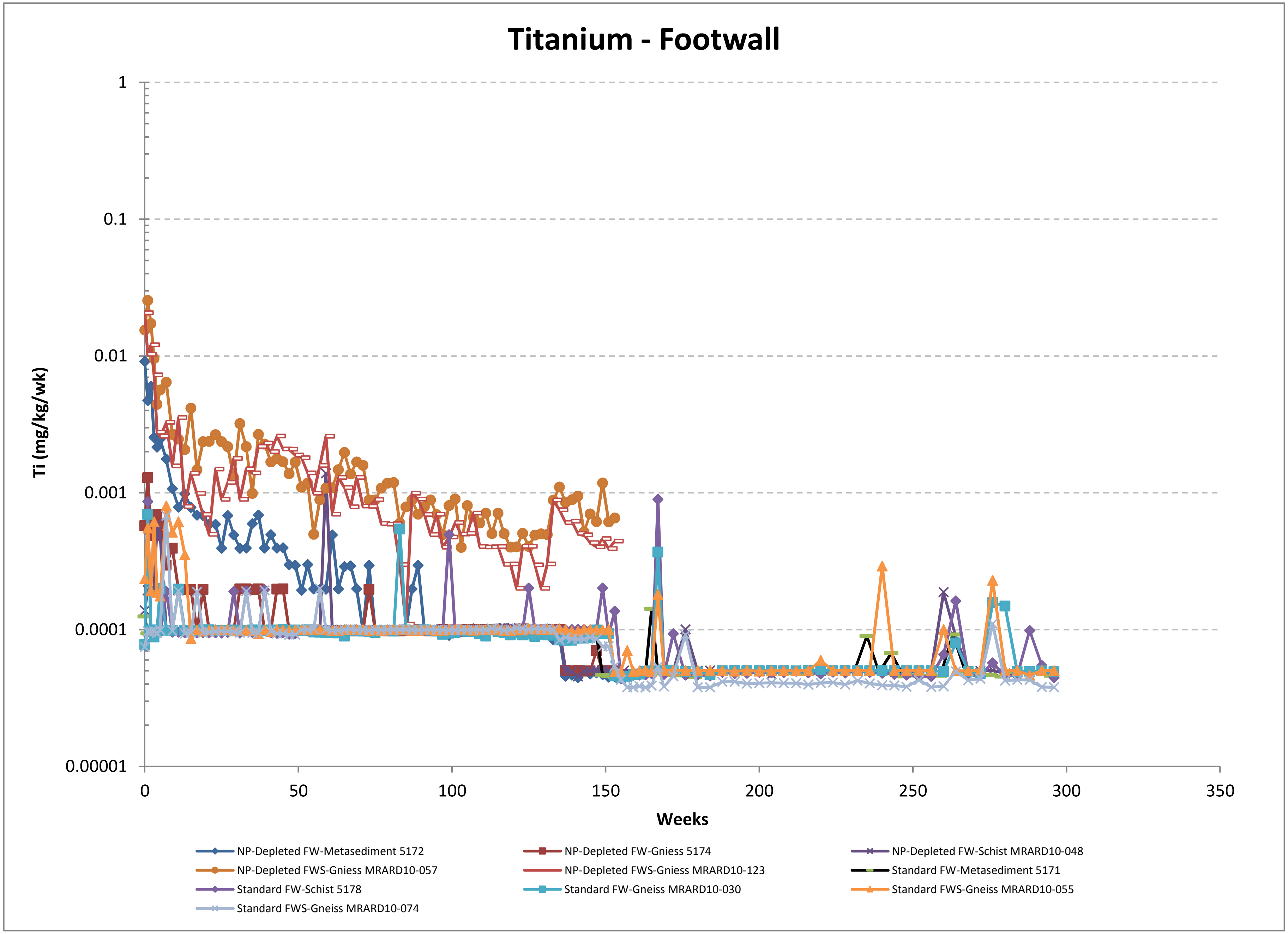
Strontium - Hanging Wall
Sr (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



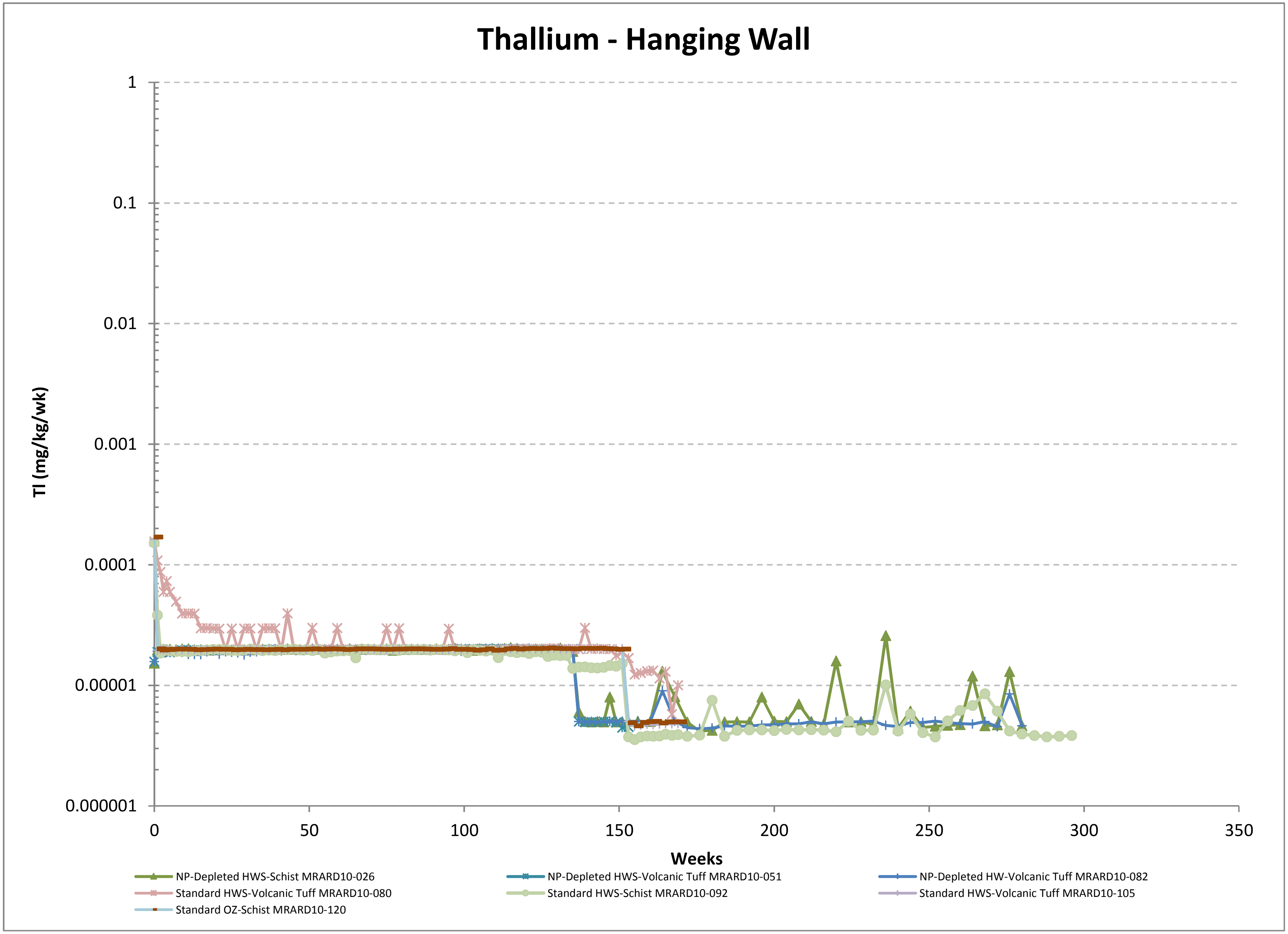
Strontium - Footwall
Sr (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



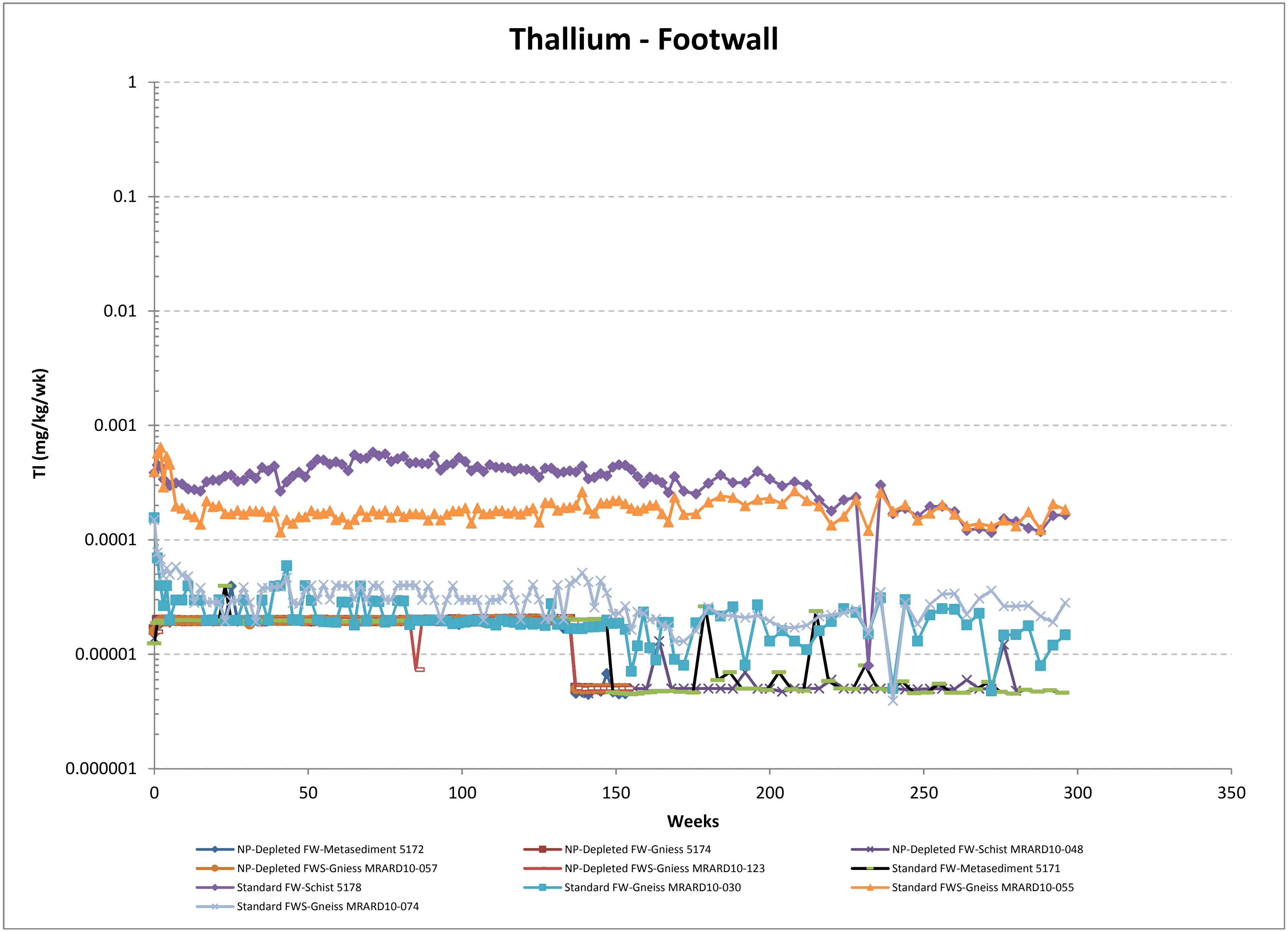
Titanium - Hanging Wall
Ti (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



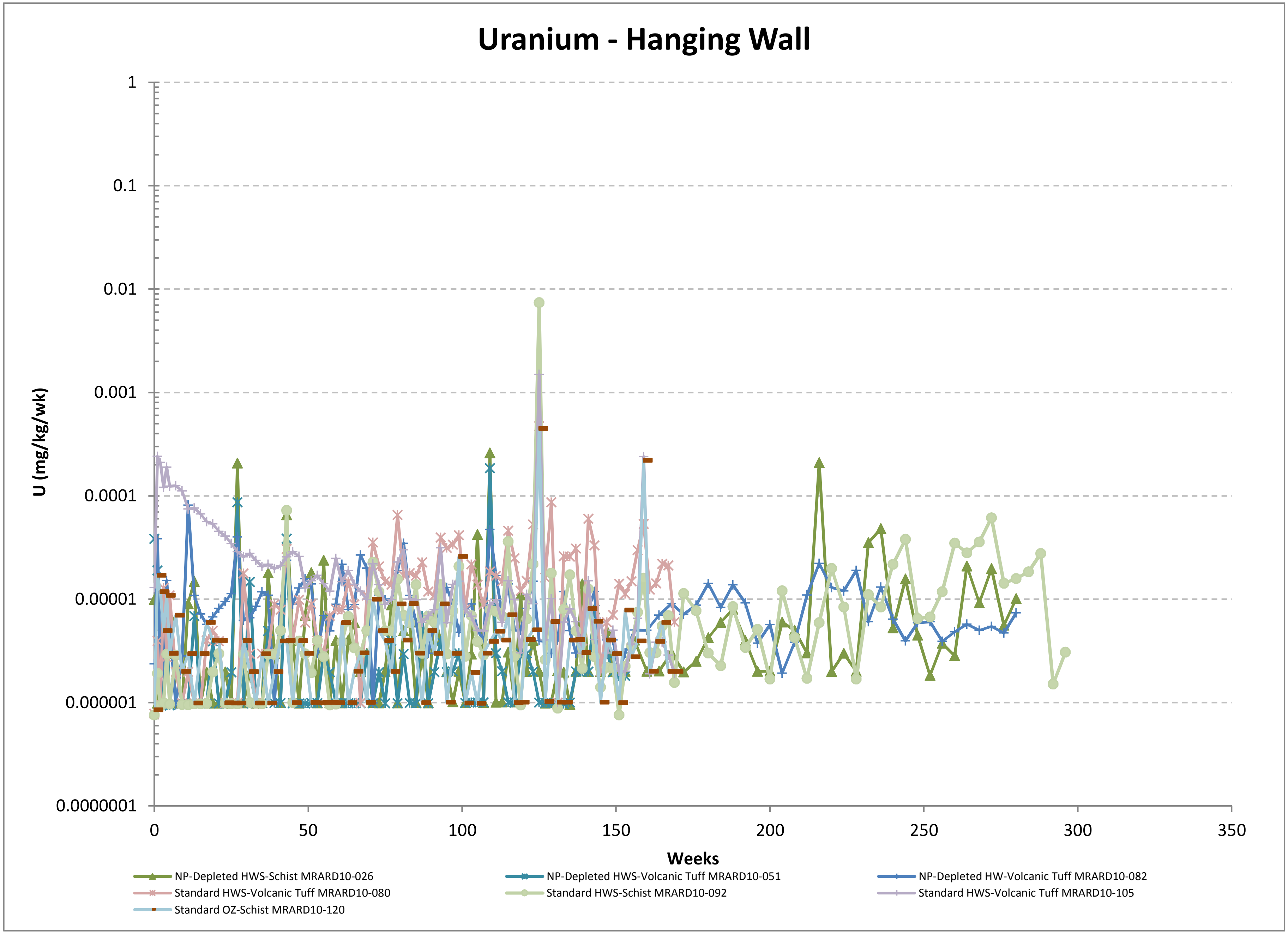
Titanium - Footwall
Ti (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



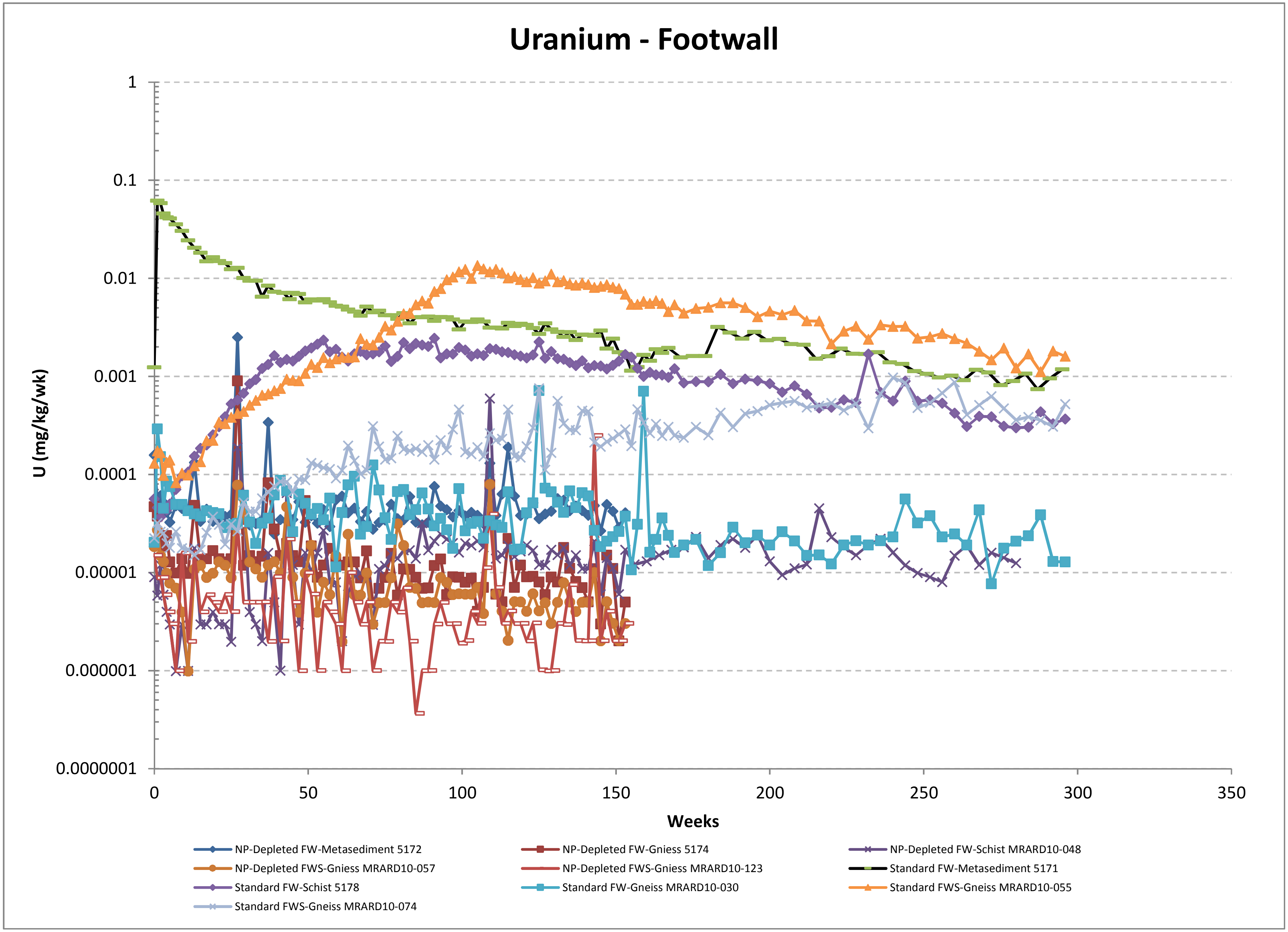
Thallium - Hanging Wall
Tl (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



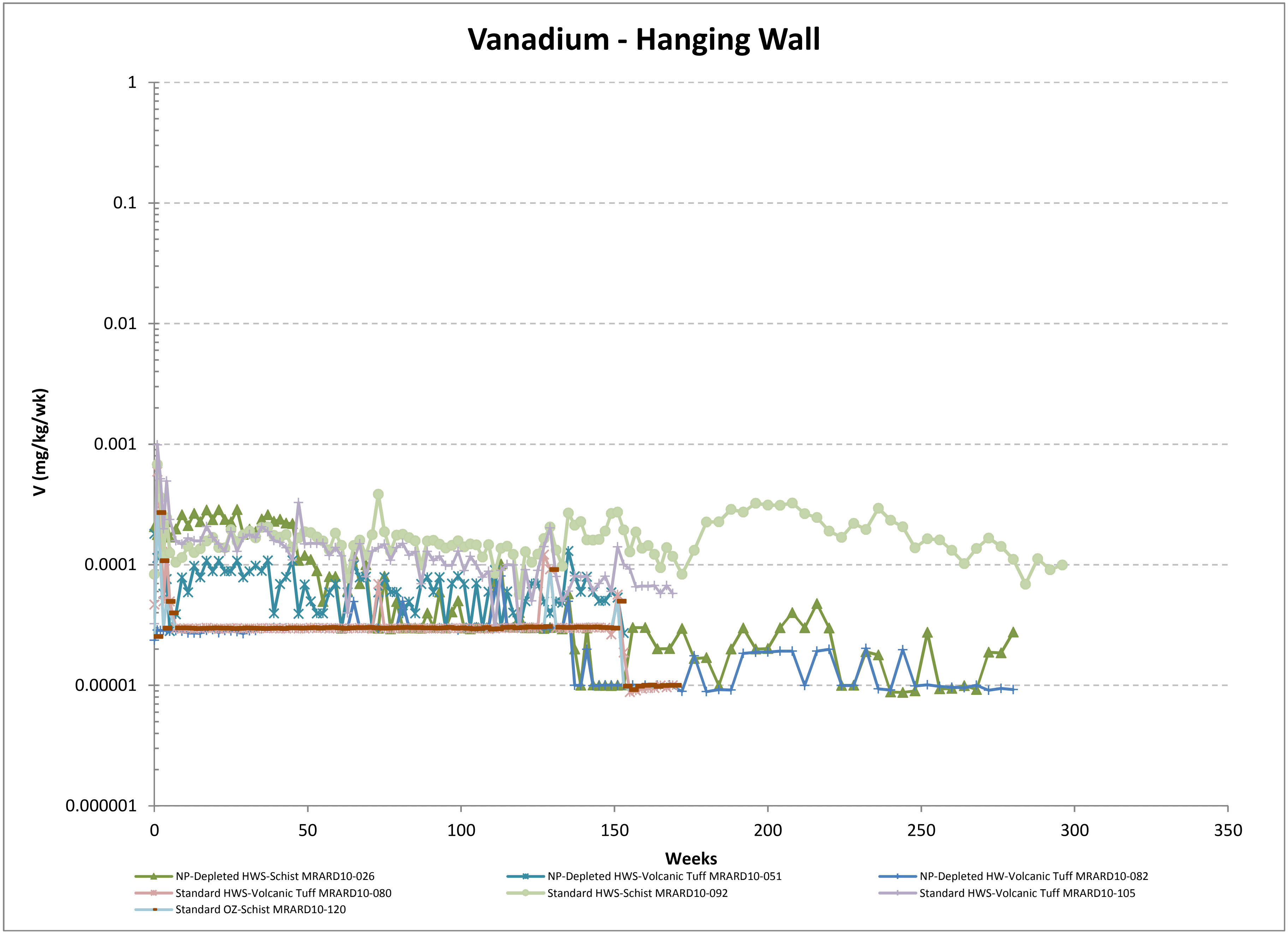
Thallium - Footwall
Tl (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

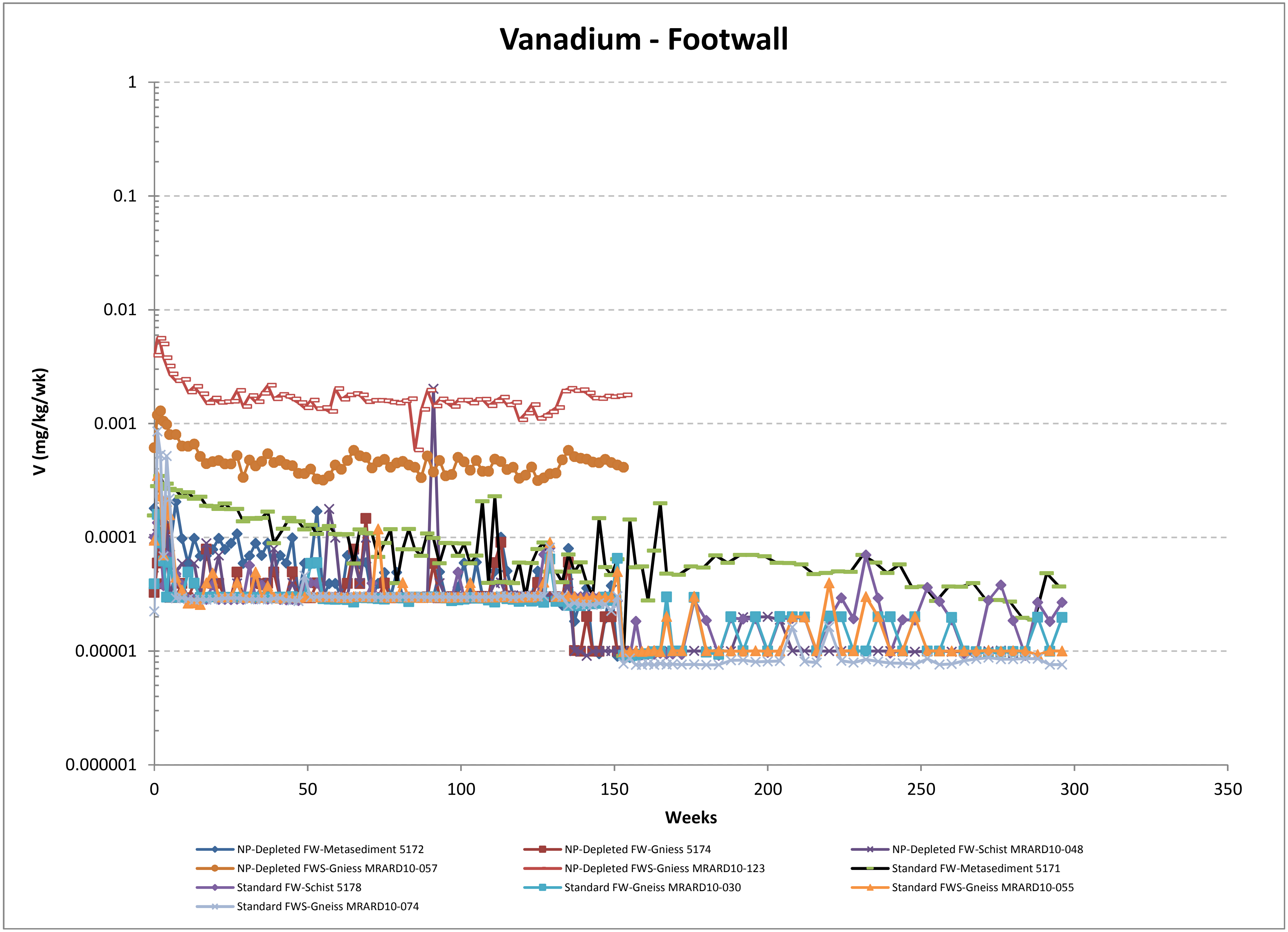


Uranium - Hanging Wall
U (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

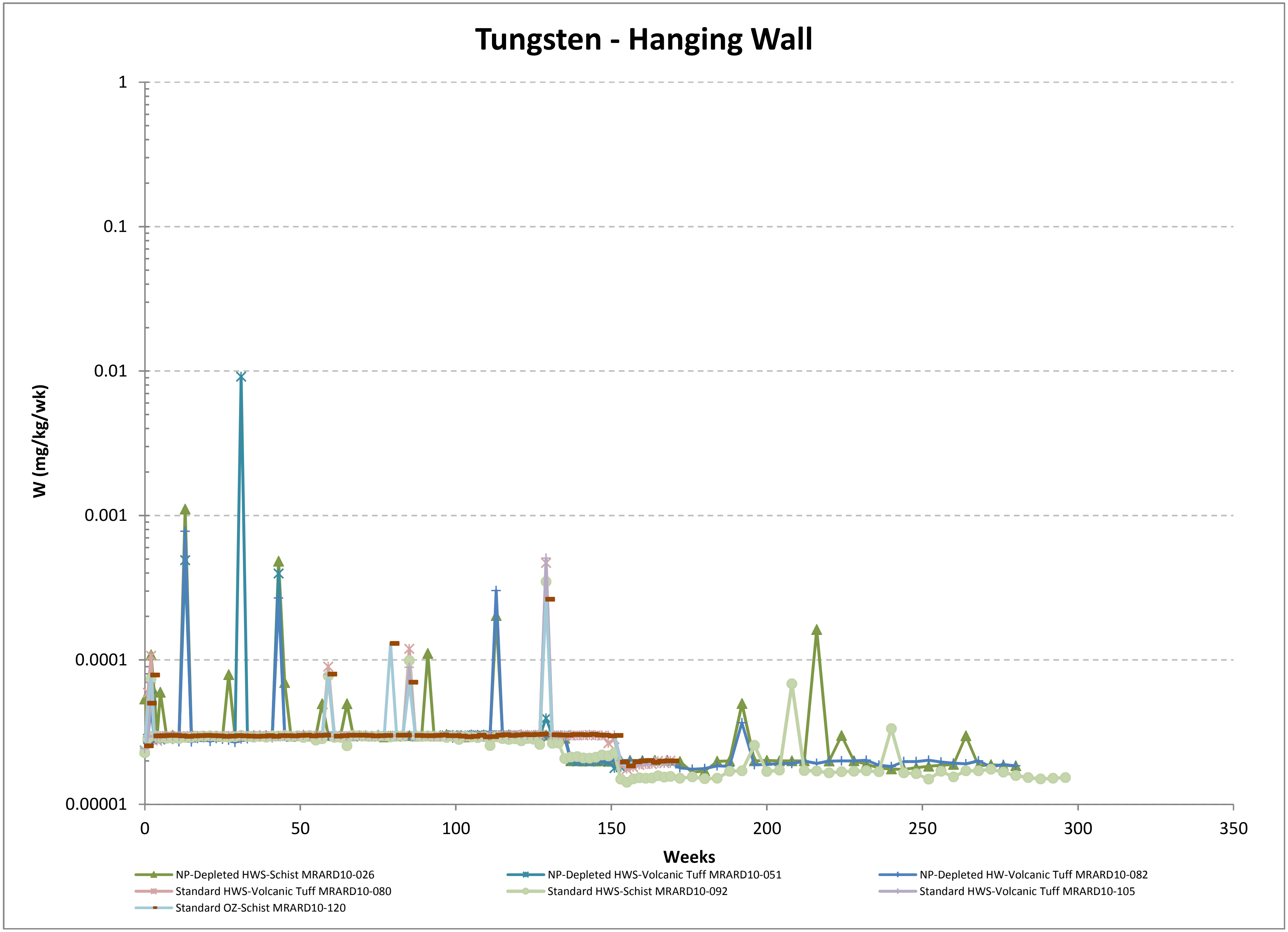


Uranium - Footwall
U (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

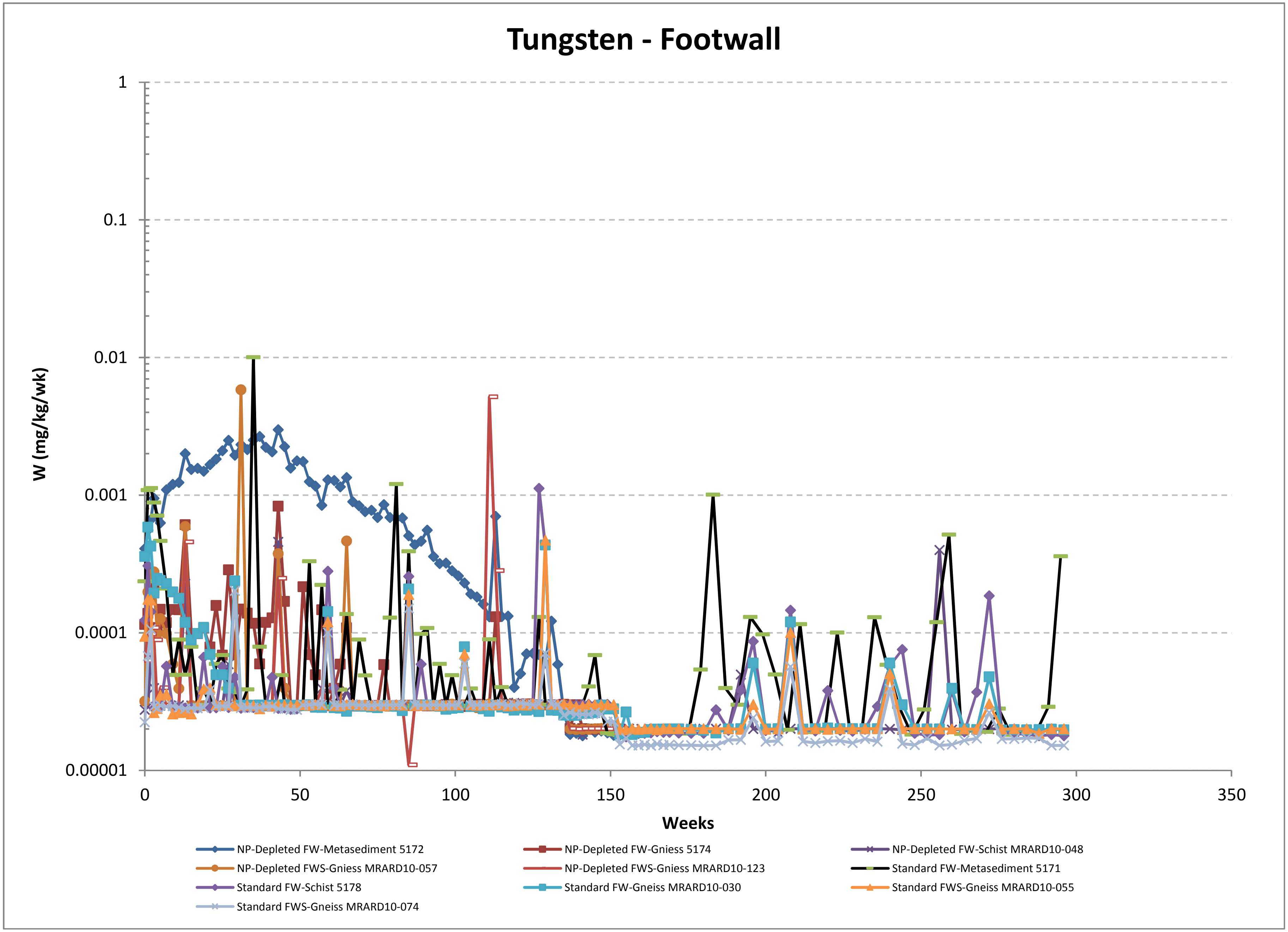

Vanadium - Hanging Wall
V (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



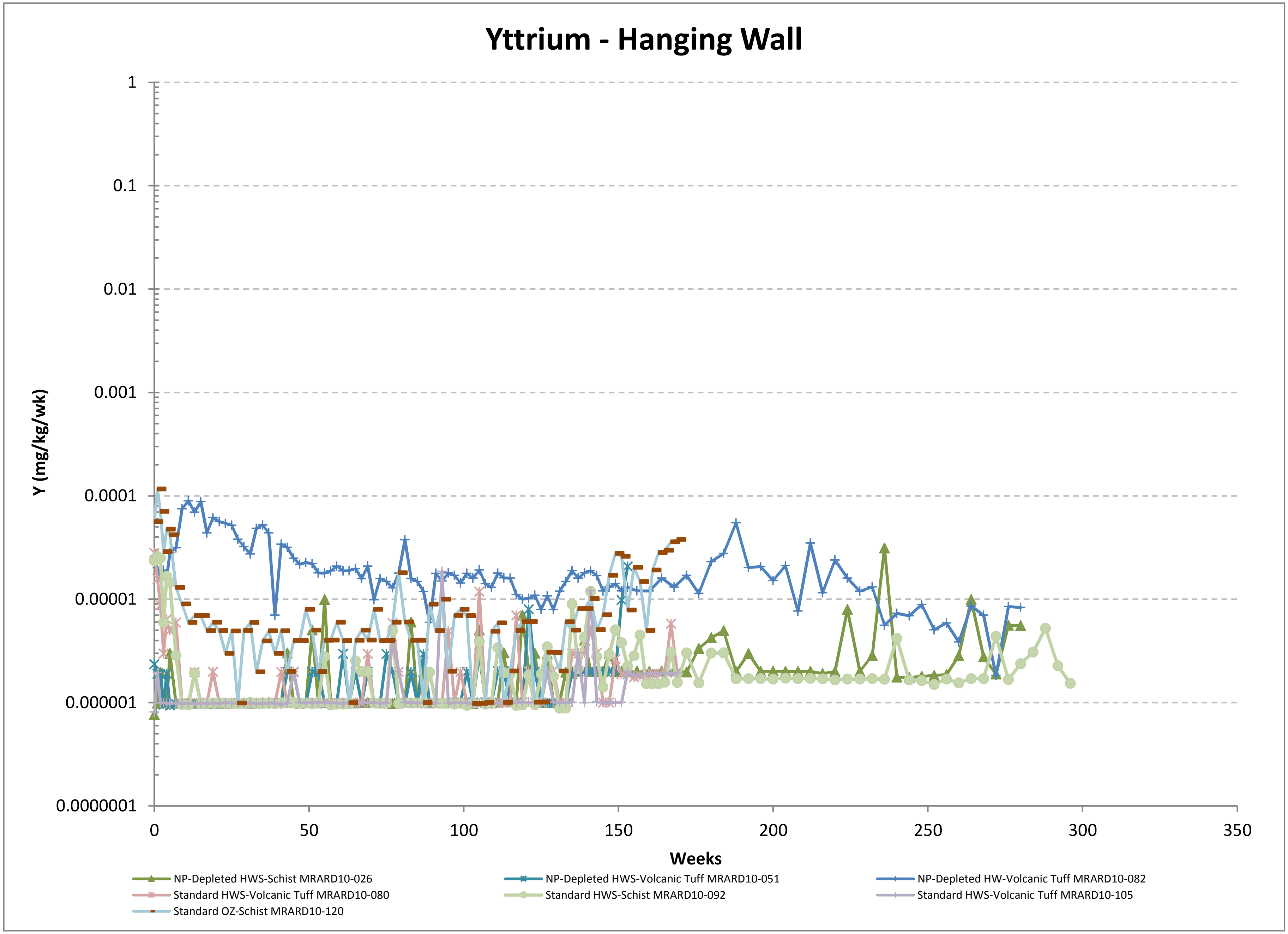
Vanadium - Footwall
V (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



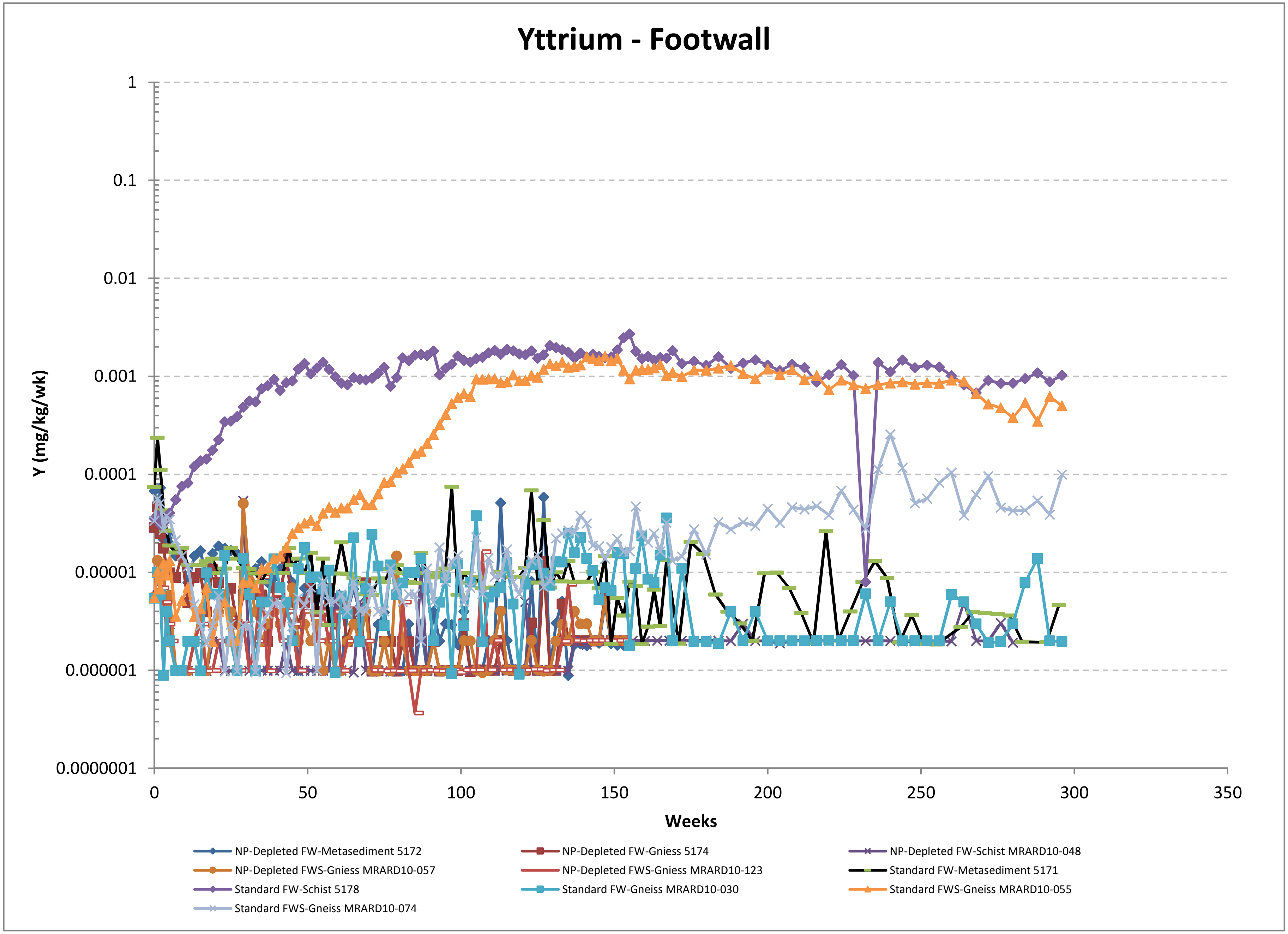
Tungsten - Hanging Wall
W (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



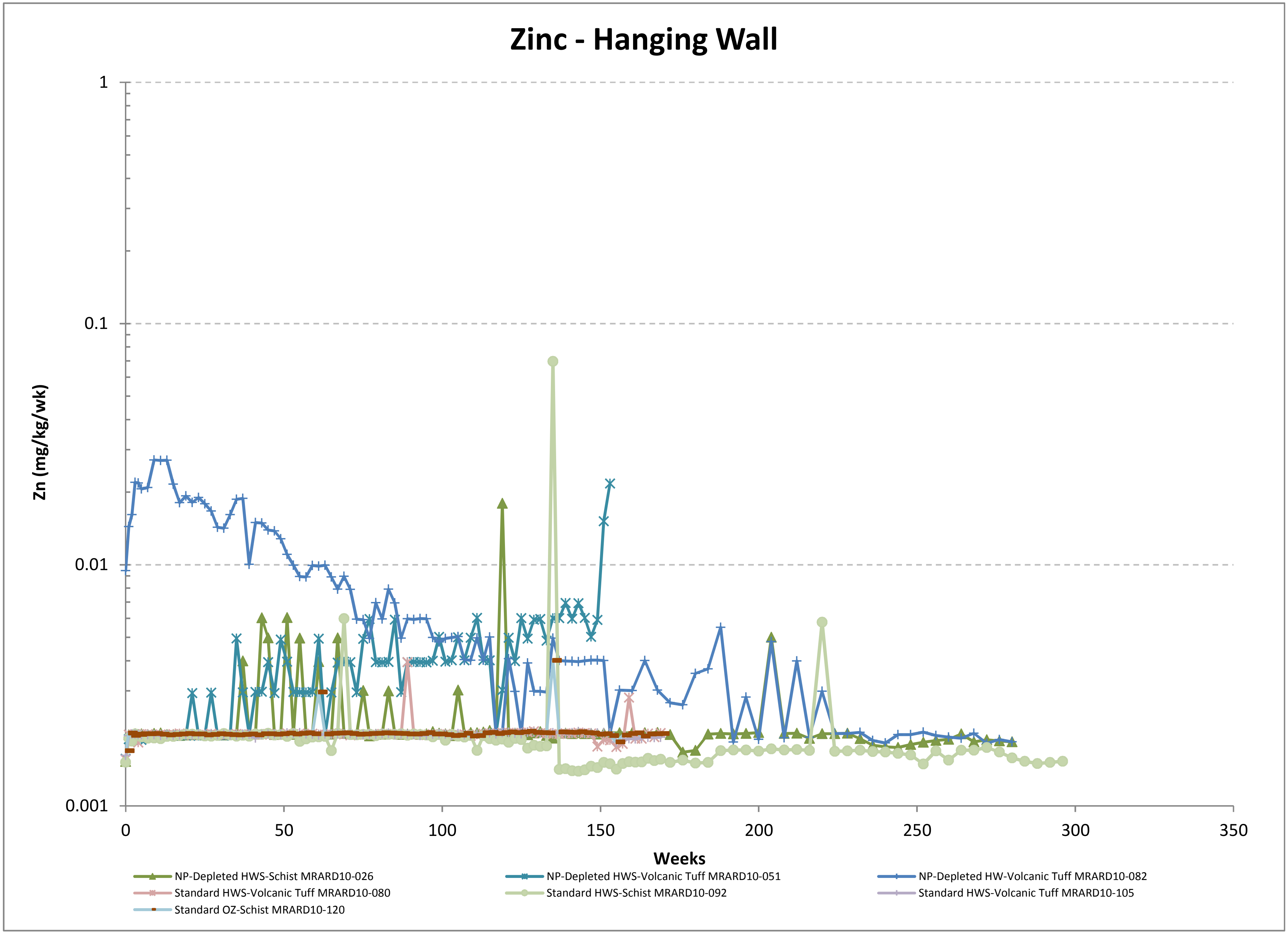
Tungsten - Footwall
W (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074



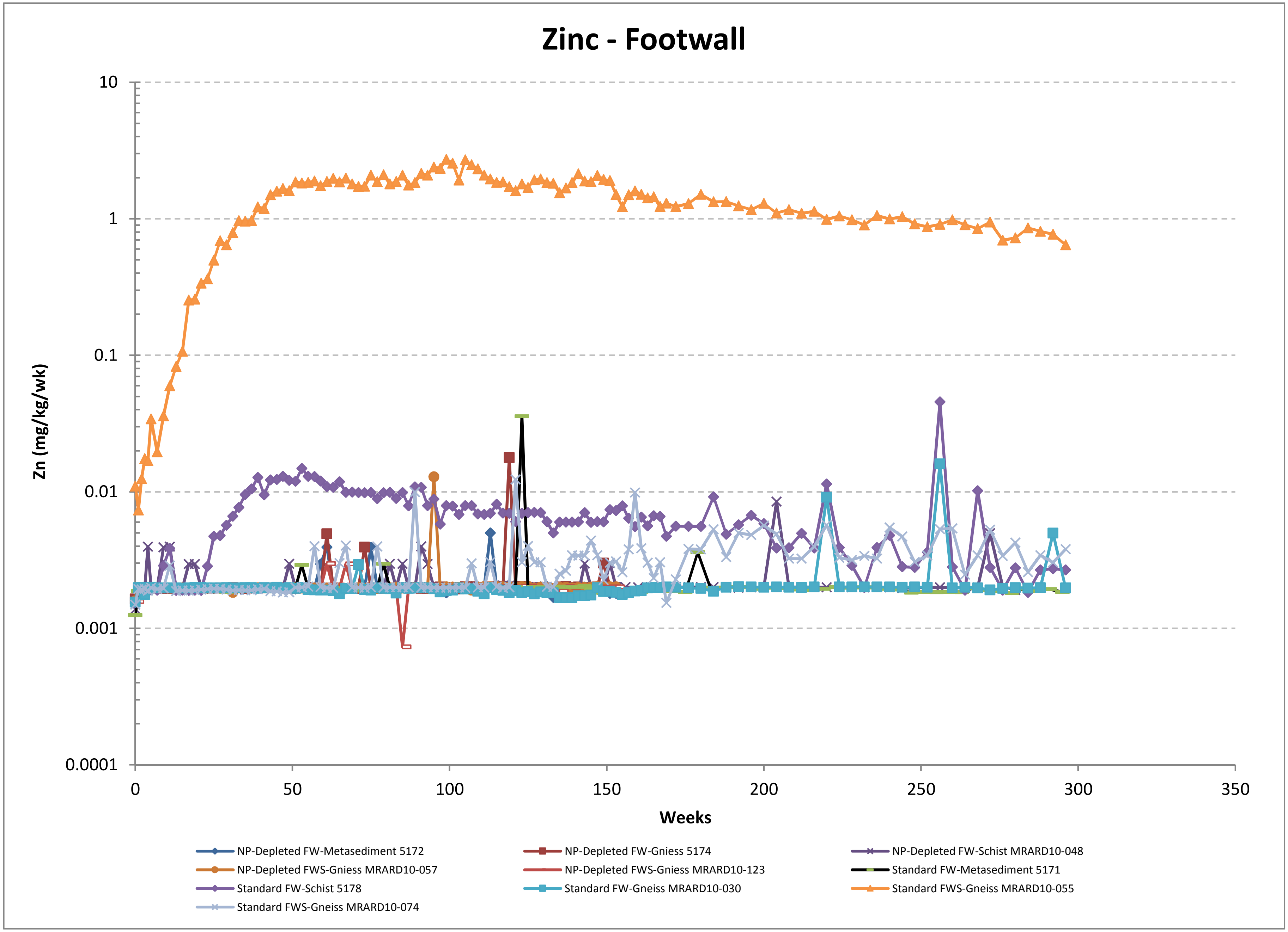
Yttrium - Hanging Wall
Y (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120



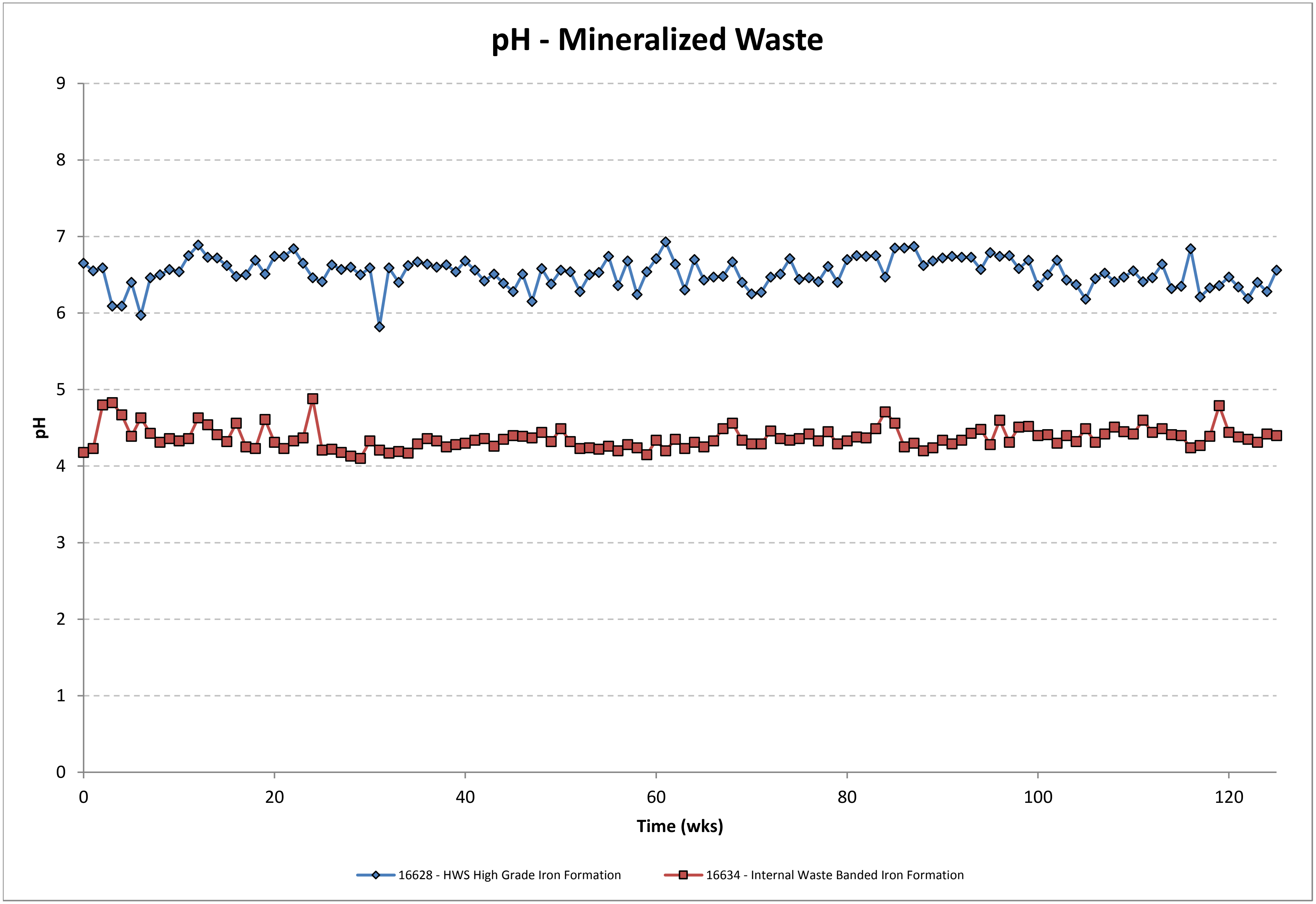
Yttrium - Footwall
Y (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gniess MRARD10-057
NP-Depleted FWS-Gniess MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

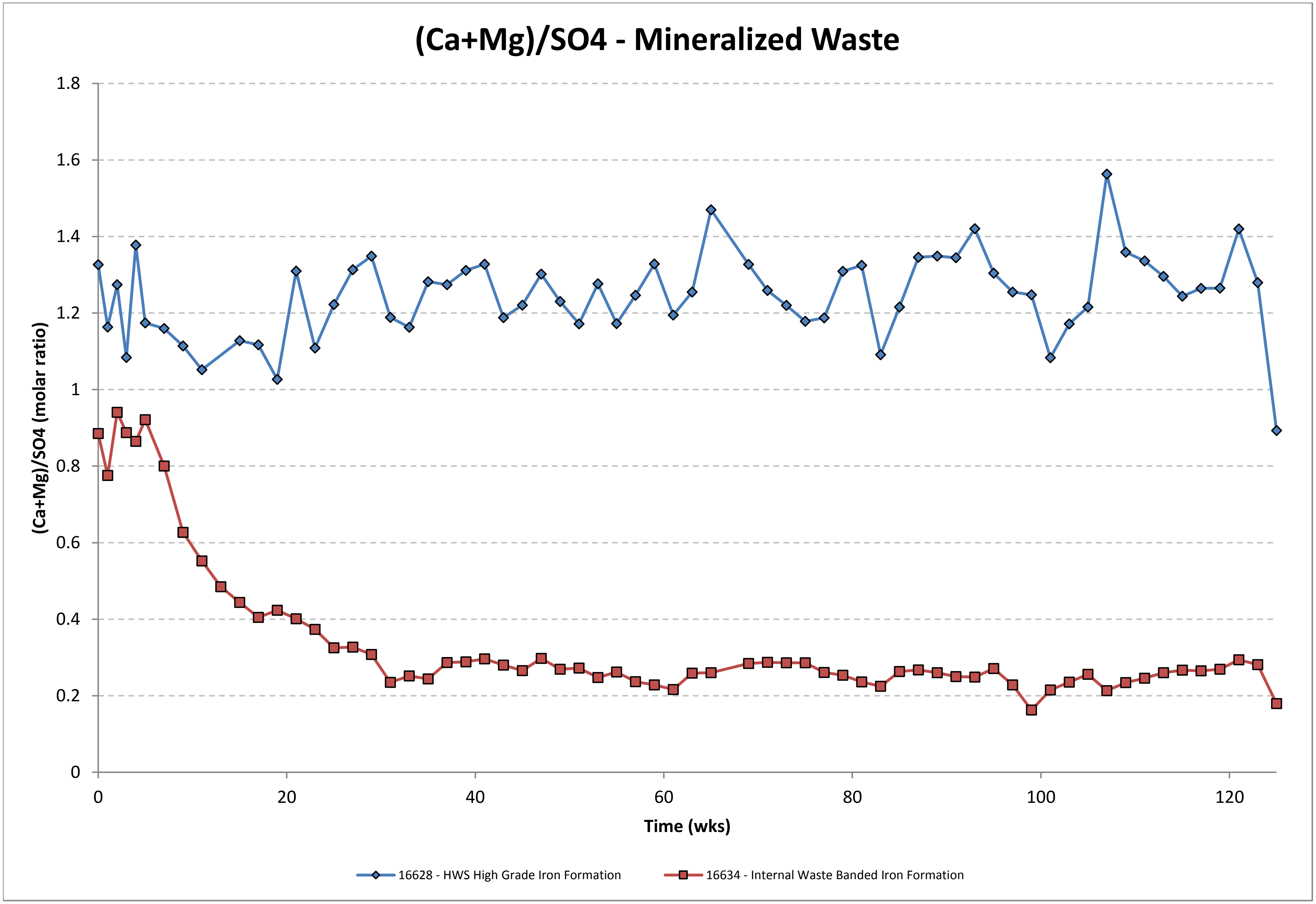


Zinc - Hanging Wall
Zn (mg/kg/wk)
1
0.1
0.01
0.001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted HWS-Schist MRARD10-026
NP-Depleted HWS-Volcanic Tuff MRARD10-051
NP-Depleted HW-Volcanic Tuff MRARD10-082
Standard HWS-Volcanic Tuff MRARD10-080
Standard HWS-Schist MRARD10-092
Standard HWS-Volcanic Tuff MRARD10-105
Standard OZ-Schist MRARD10-120

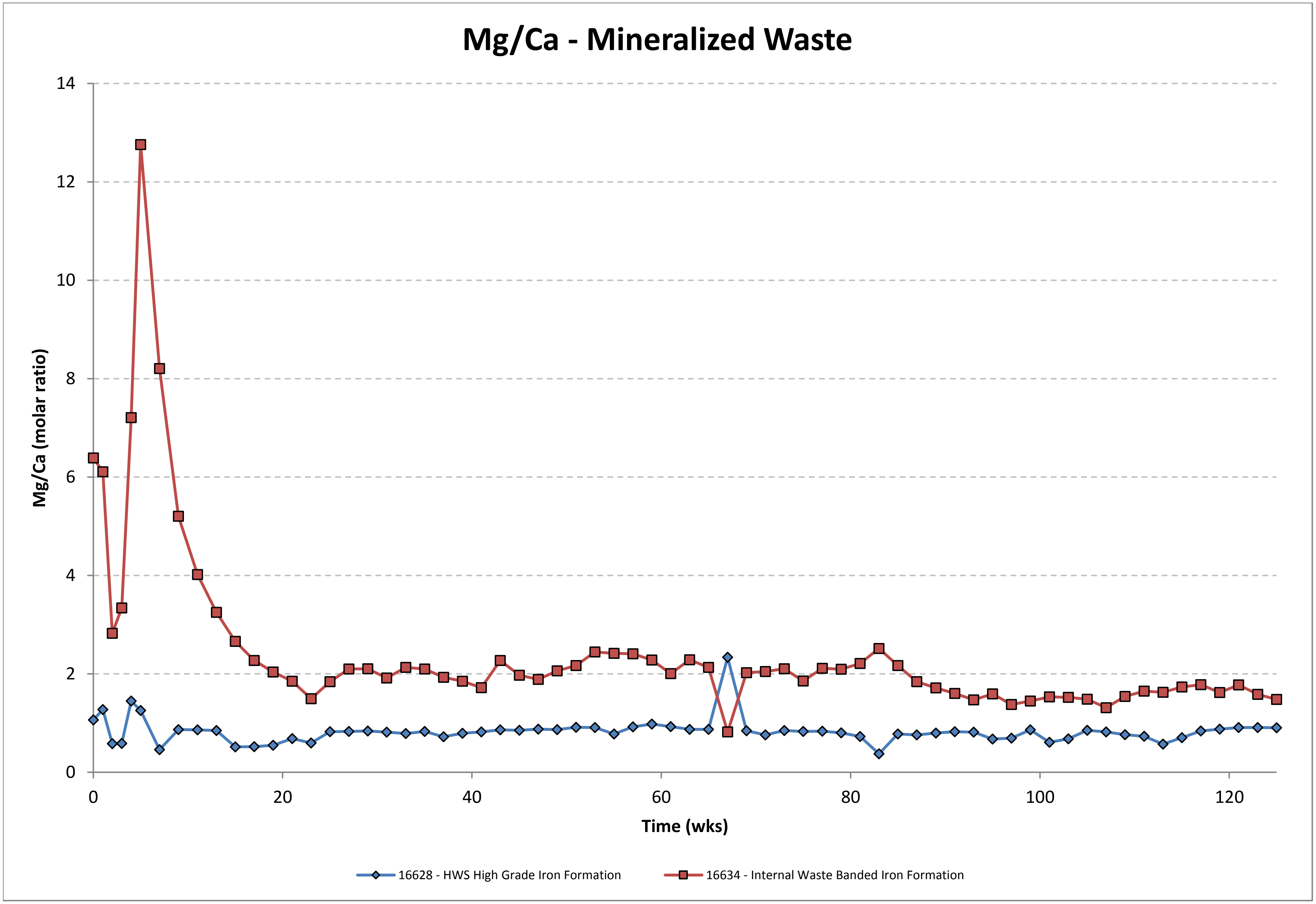

Zinc - Footwall
Zn (mg/kg/wk)
10
1
0.1
0.01
0.001
0.0001
0
50
100
150
200
250
300
350
Weeks
NP-Depleted FW-Metasediment 5172
NP-Depleted FW-Gniess 5174
NP-Depleted FW-Schist MRARD10-048
NP-Depleted FWS-Gneiss MRARD10-057
NP-Depleted FWS-Gneiss MRARD10-123
Standard FW-Metasediment 5171
Standard FW-Schist 5178
Standard FW-Gneiss MRARD10-030
Standard FWS-Gneiss MRARD10-055
Standard FWS-Gneiss MRARD10-074

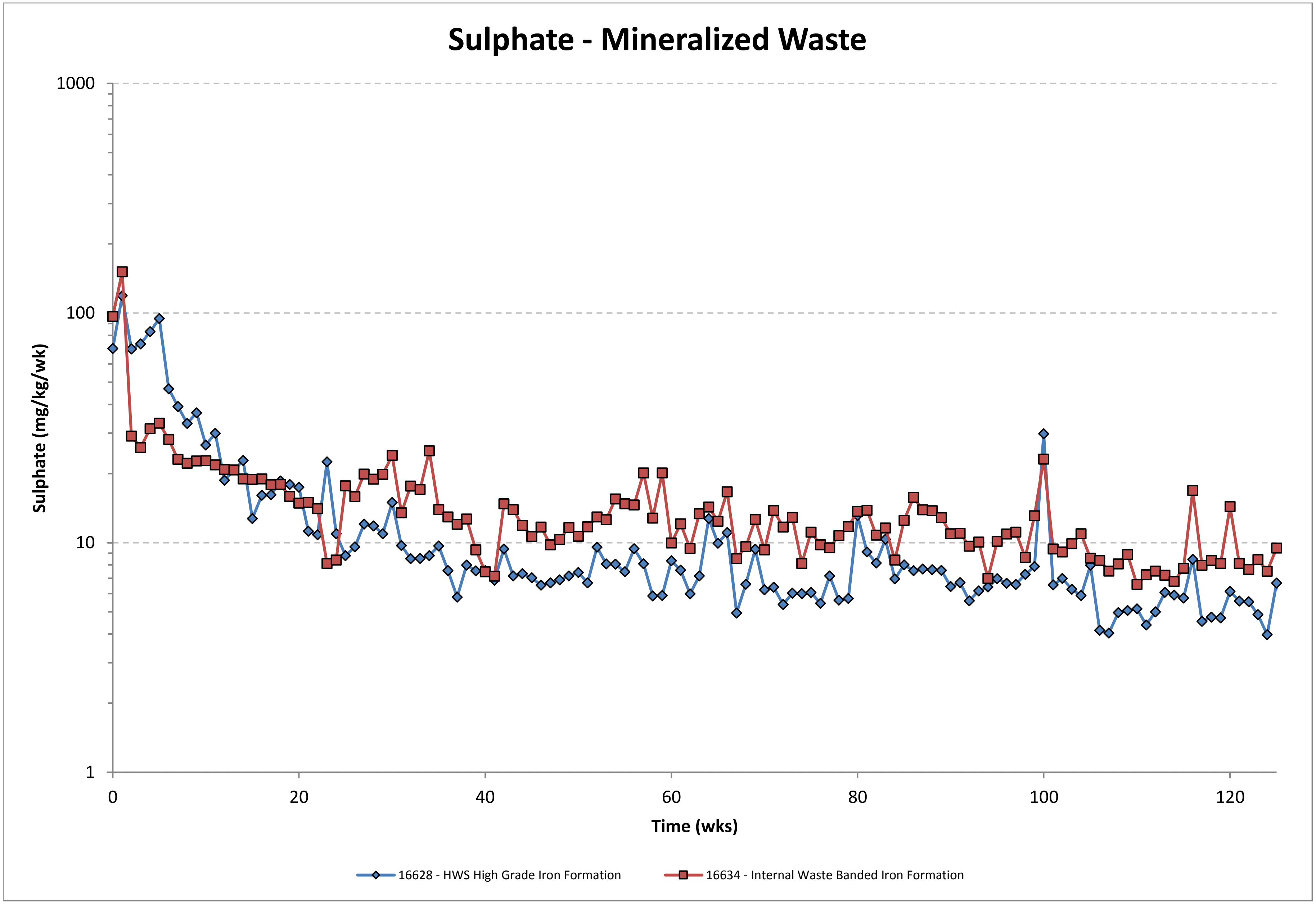
Mineralized Waste Humidity Cell Plots


pH - Mineralized Waste
pH
Time (wks)
0
1
2
3
4
5
6
7
8
9
0
20
40
60
80
100
120
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

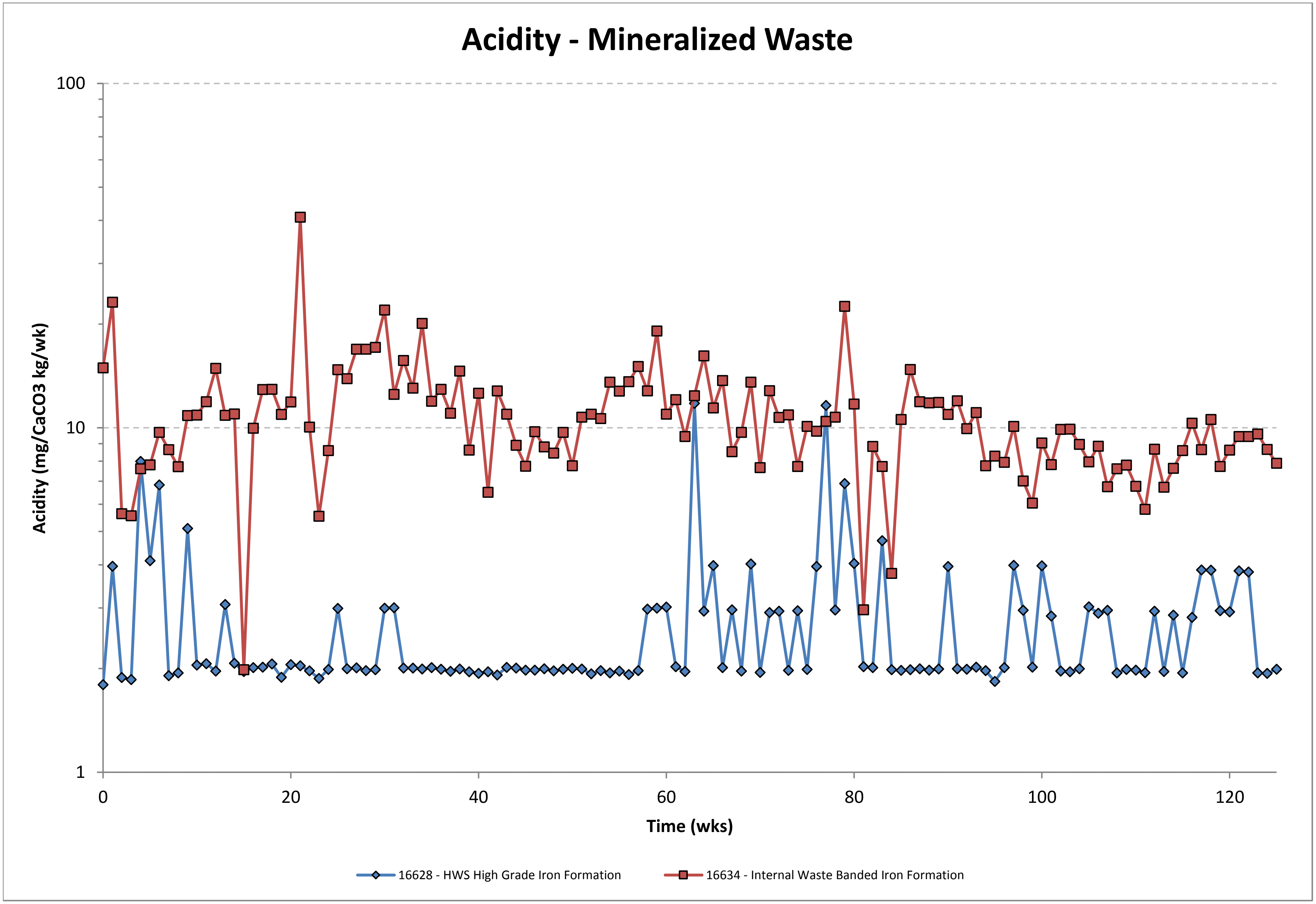


(Ca+Mg)/SO4 - Mineralized Waste
(Ca+Mg)/SO4 (molar ratio)
Time (wks)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
0
20
40
60
80
100
120
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

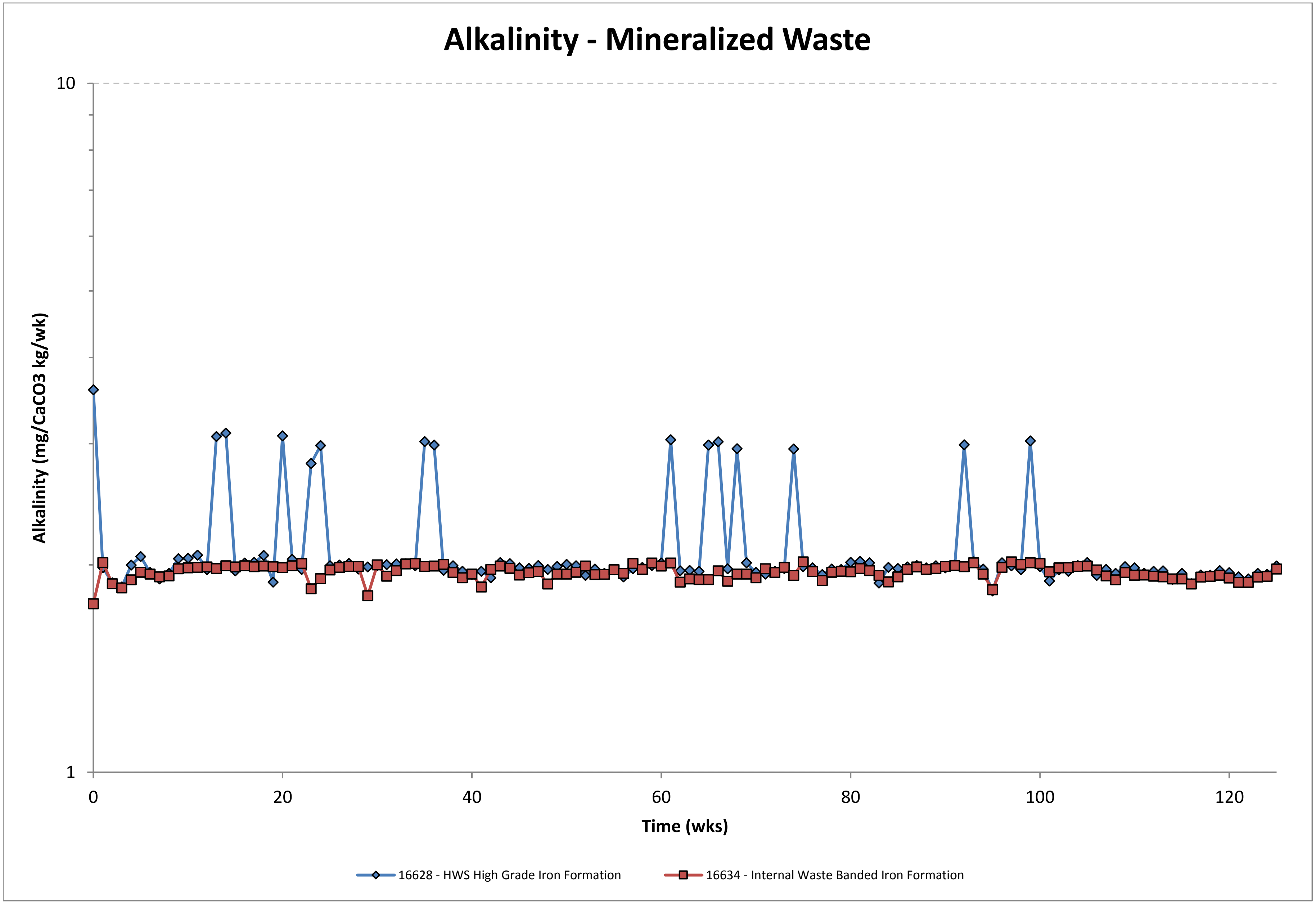

Mg/Ca - Mineralized Waste
Mg/Ca (molar ratio)
0
2
4
6
8
10
12
14
Time (wks)
0
20
40
60
80
100
120
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

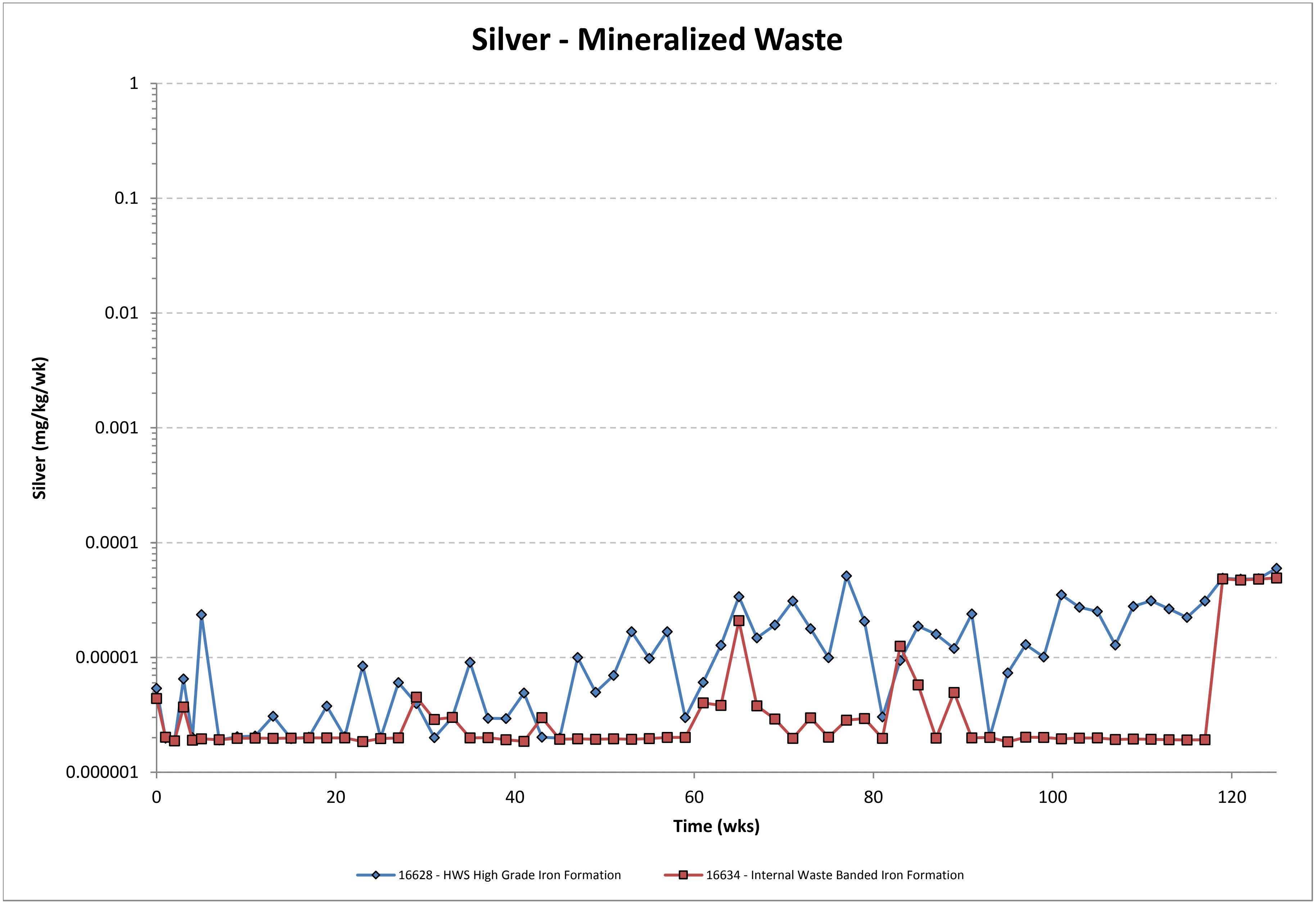


Sulphate - Mineralized Waste
1000
100
10
1
Sulphate (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

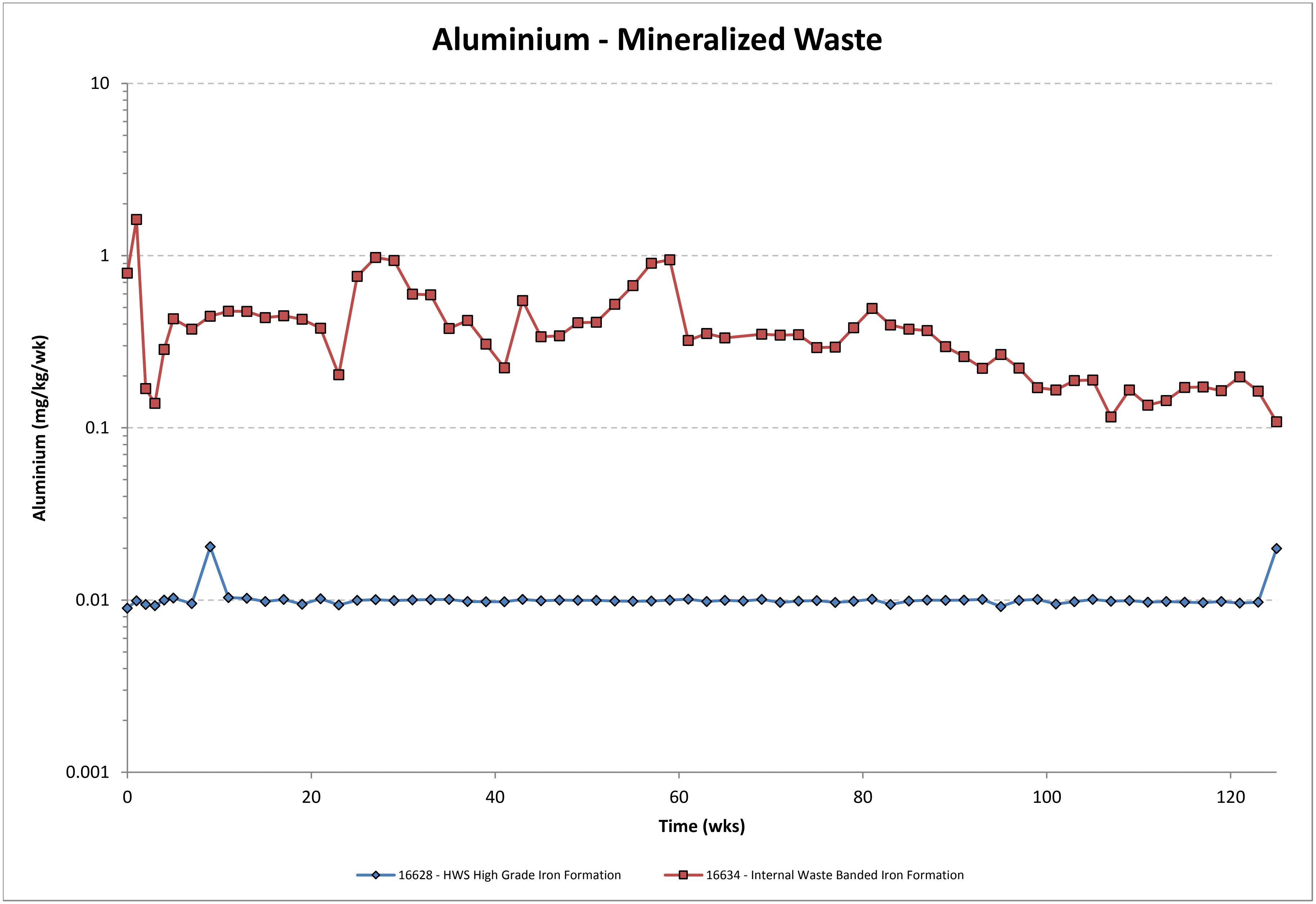


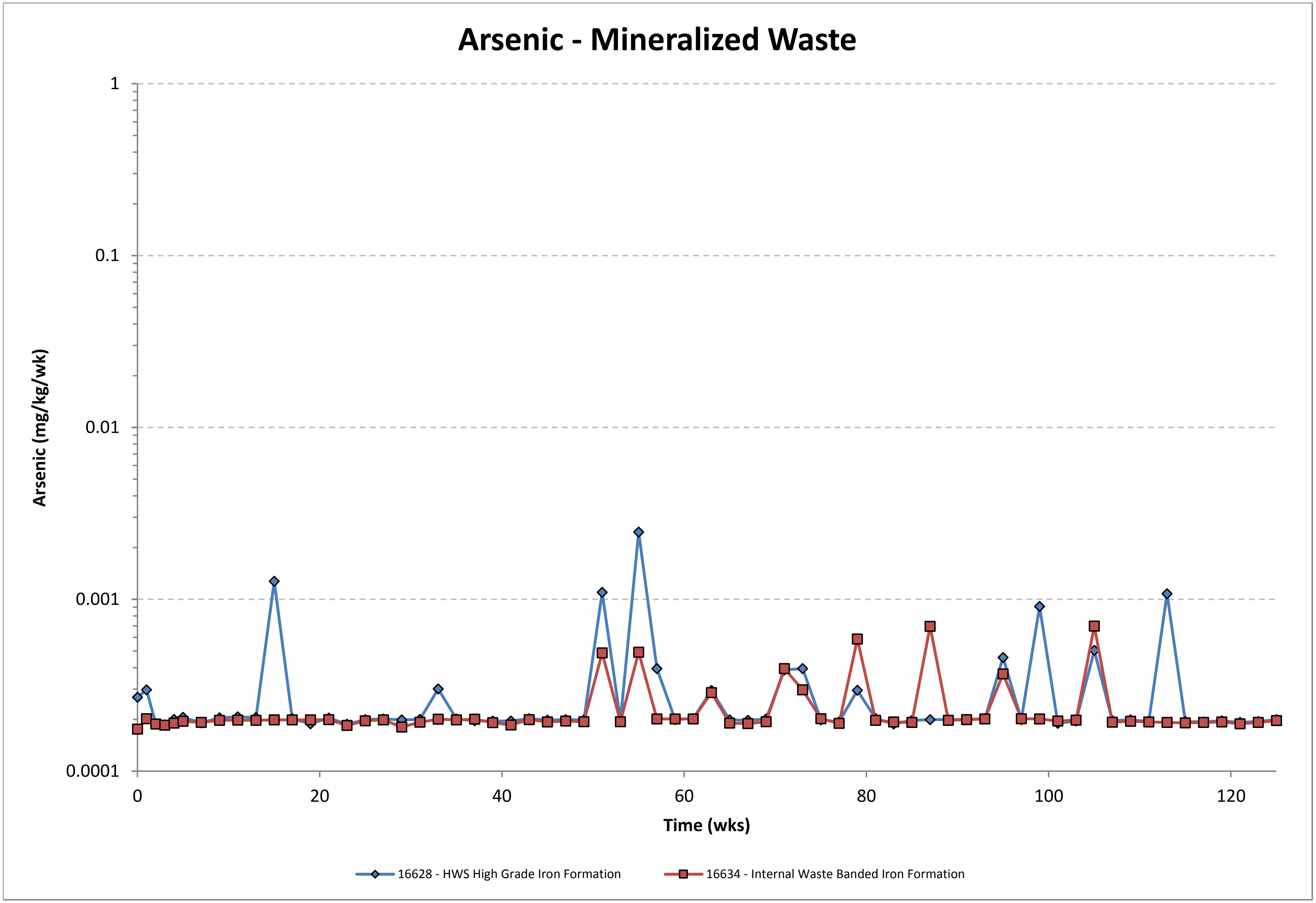
Acidity - Mineralized Waste
100
10
1
Acidity (mg/CaCO3 kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation


Alkalinity - Mineralized Waste
Alkalinity (mg/CaCO3 kg/wk)
10
1
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

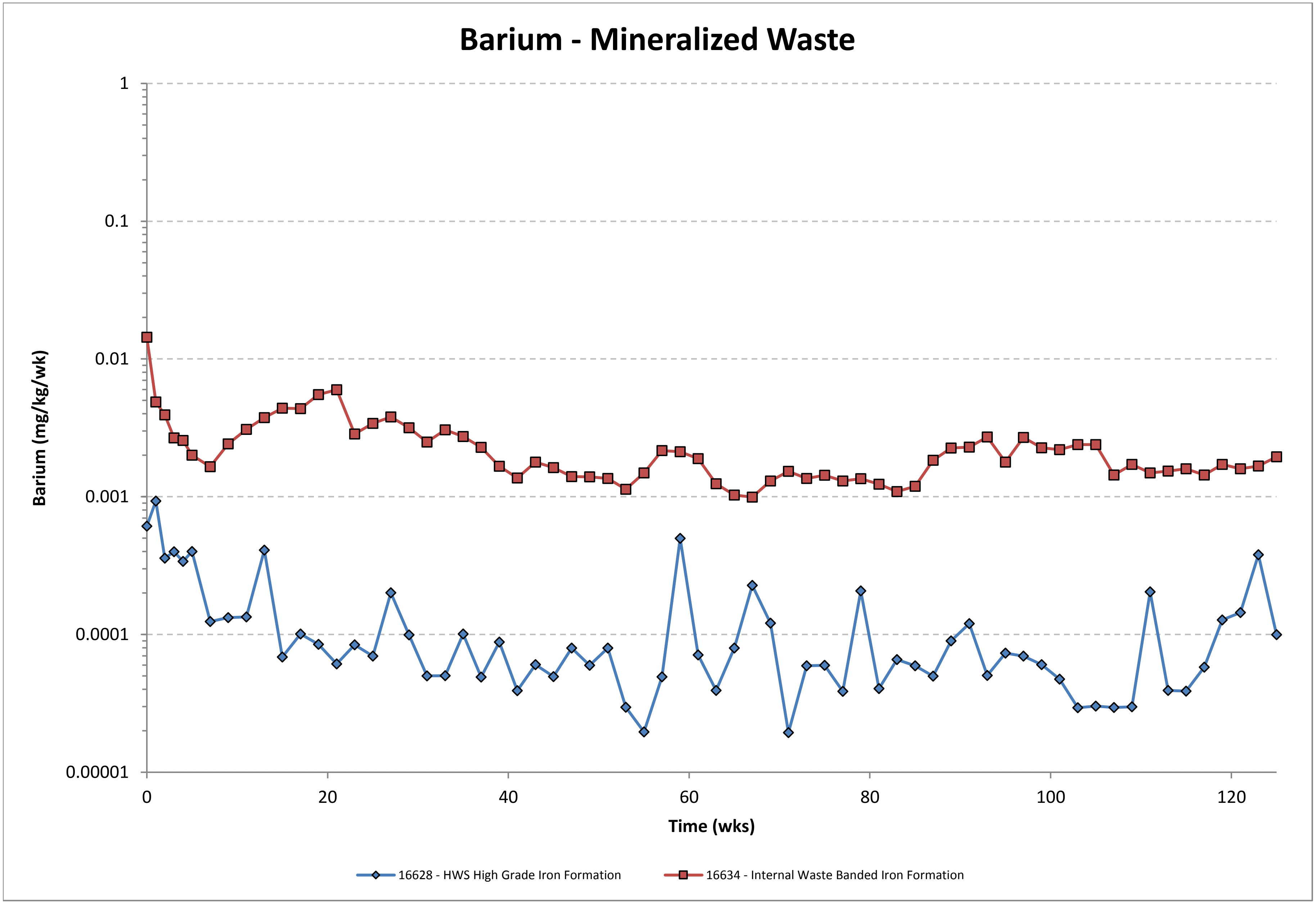


Silver - Mineralized Waste
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
Silver (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

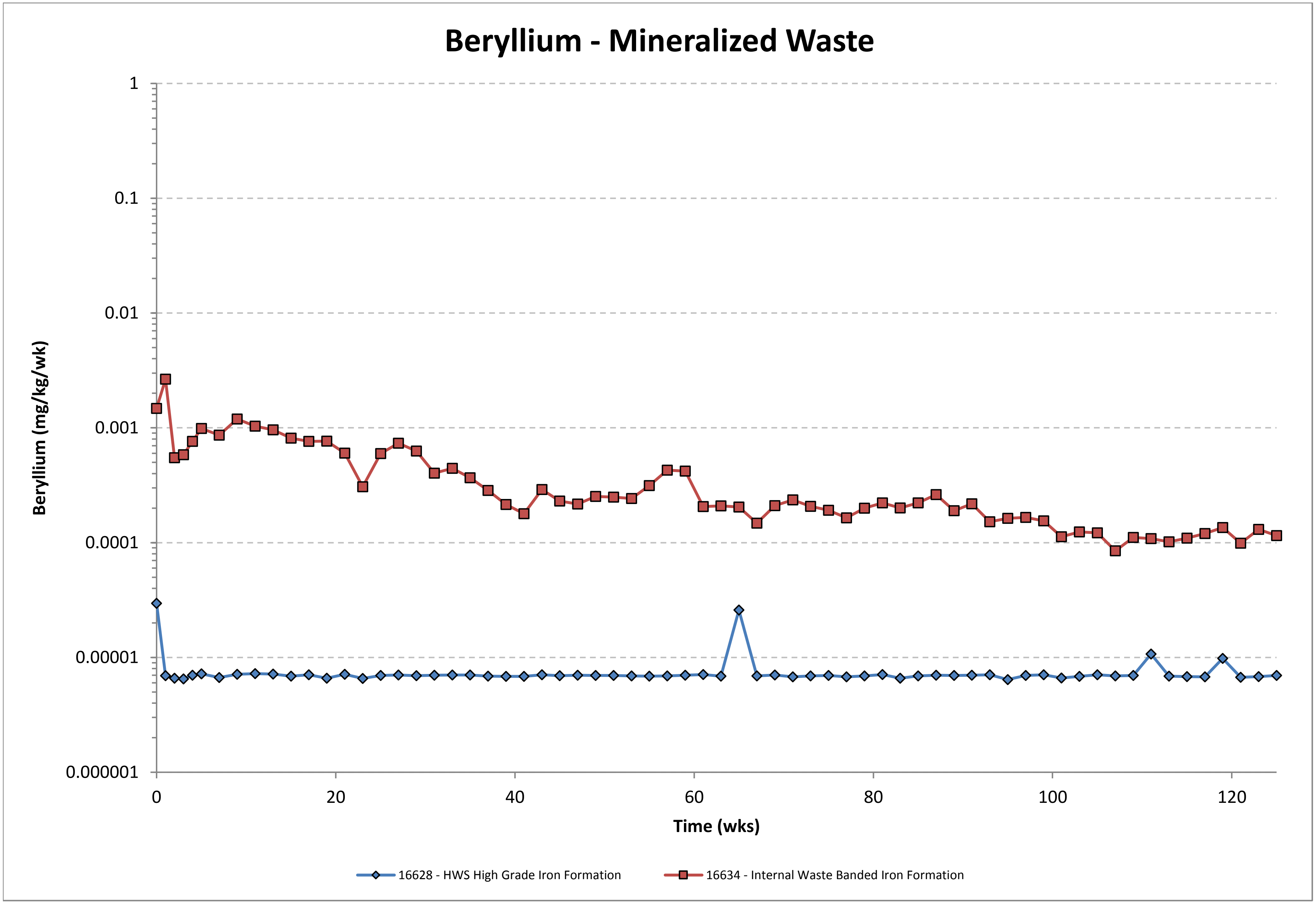

Aluminium - Mineralized Waste
10
1
0.1
0.01
0.001
Aluminium (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



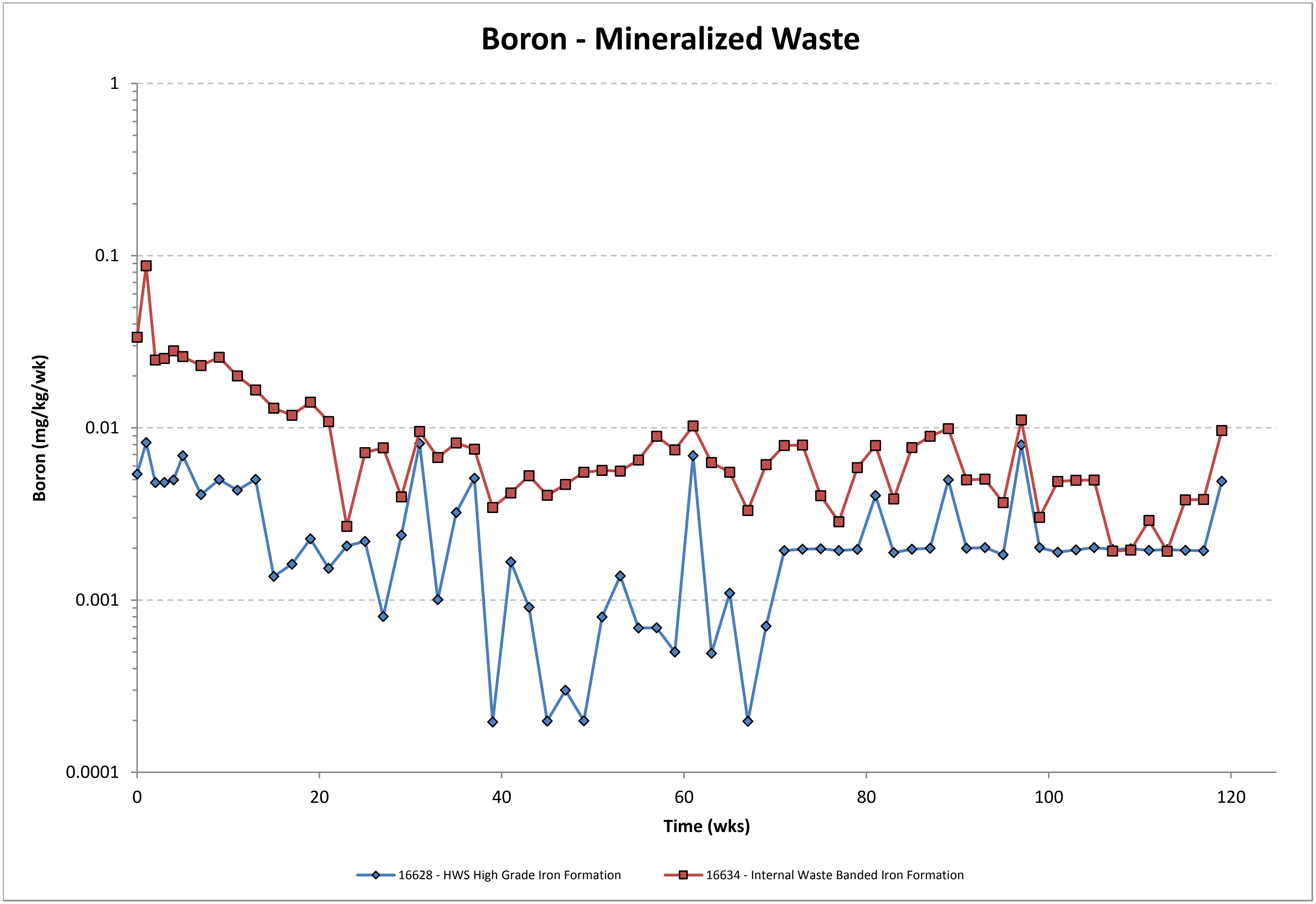
Arsenic - Mineralized Waste
Arsenic (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



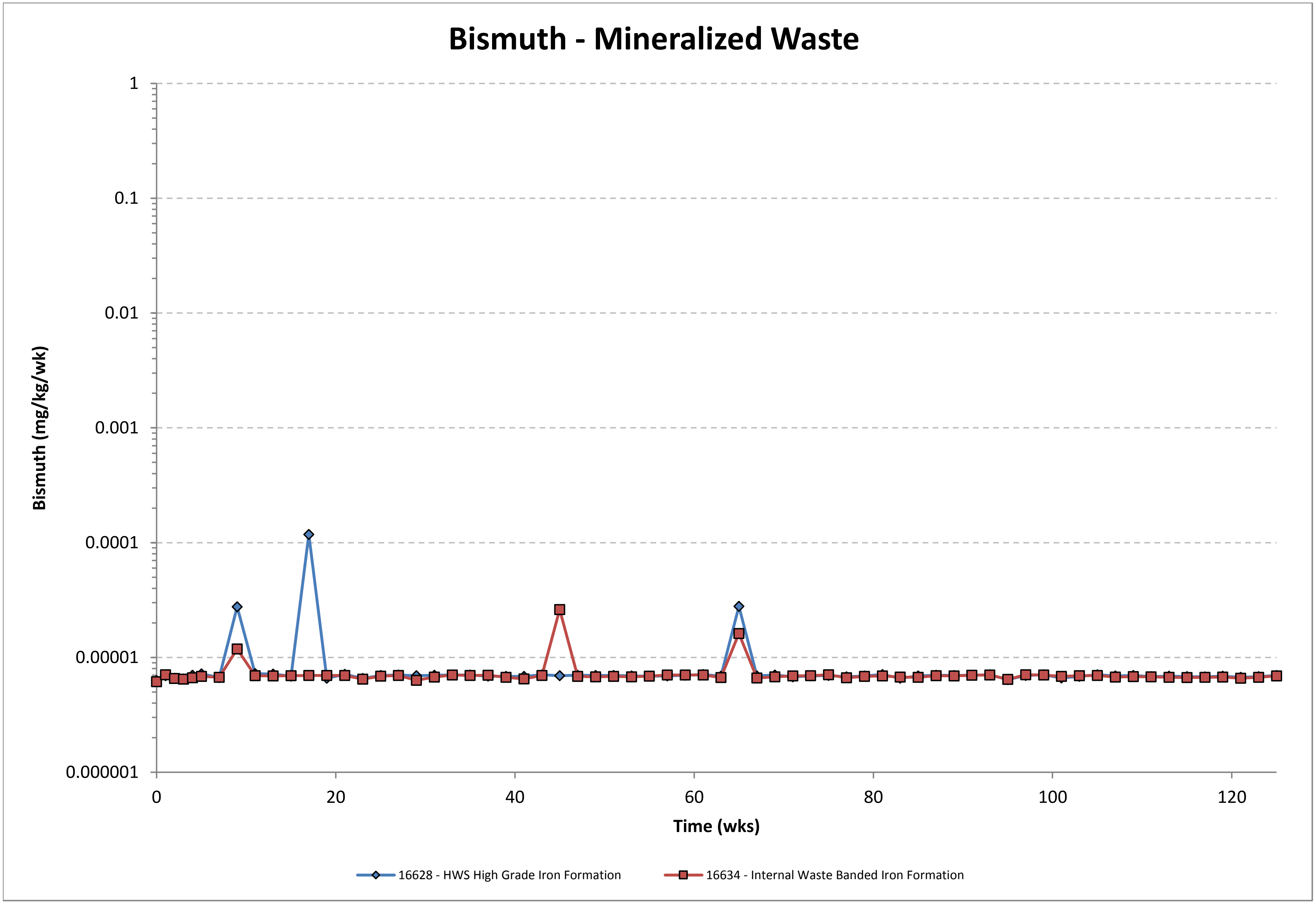
Barium - Mineralized Waste
Barium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



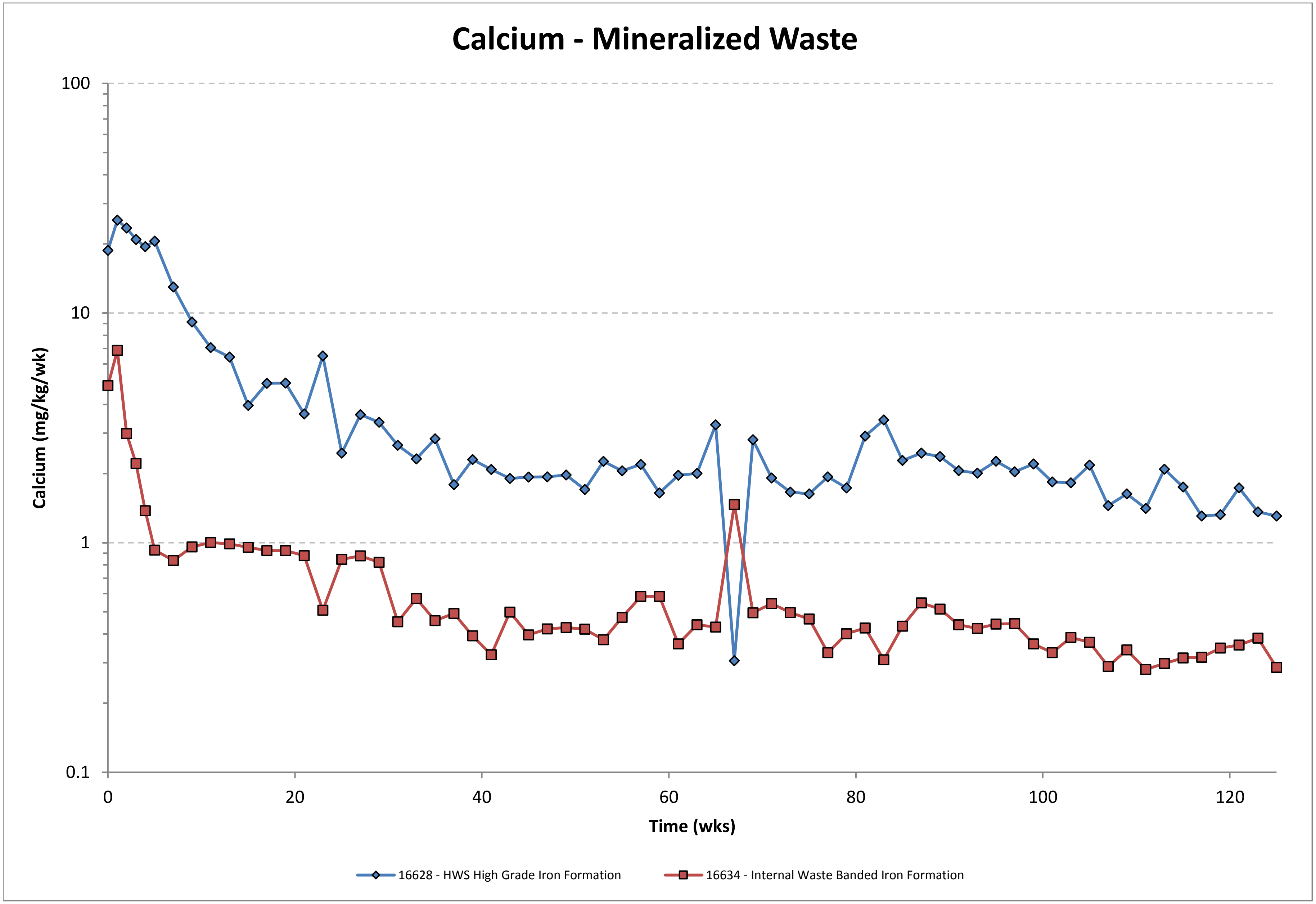
Beryllium - Mineralized Waste
Beryllium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



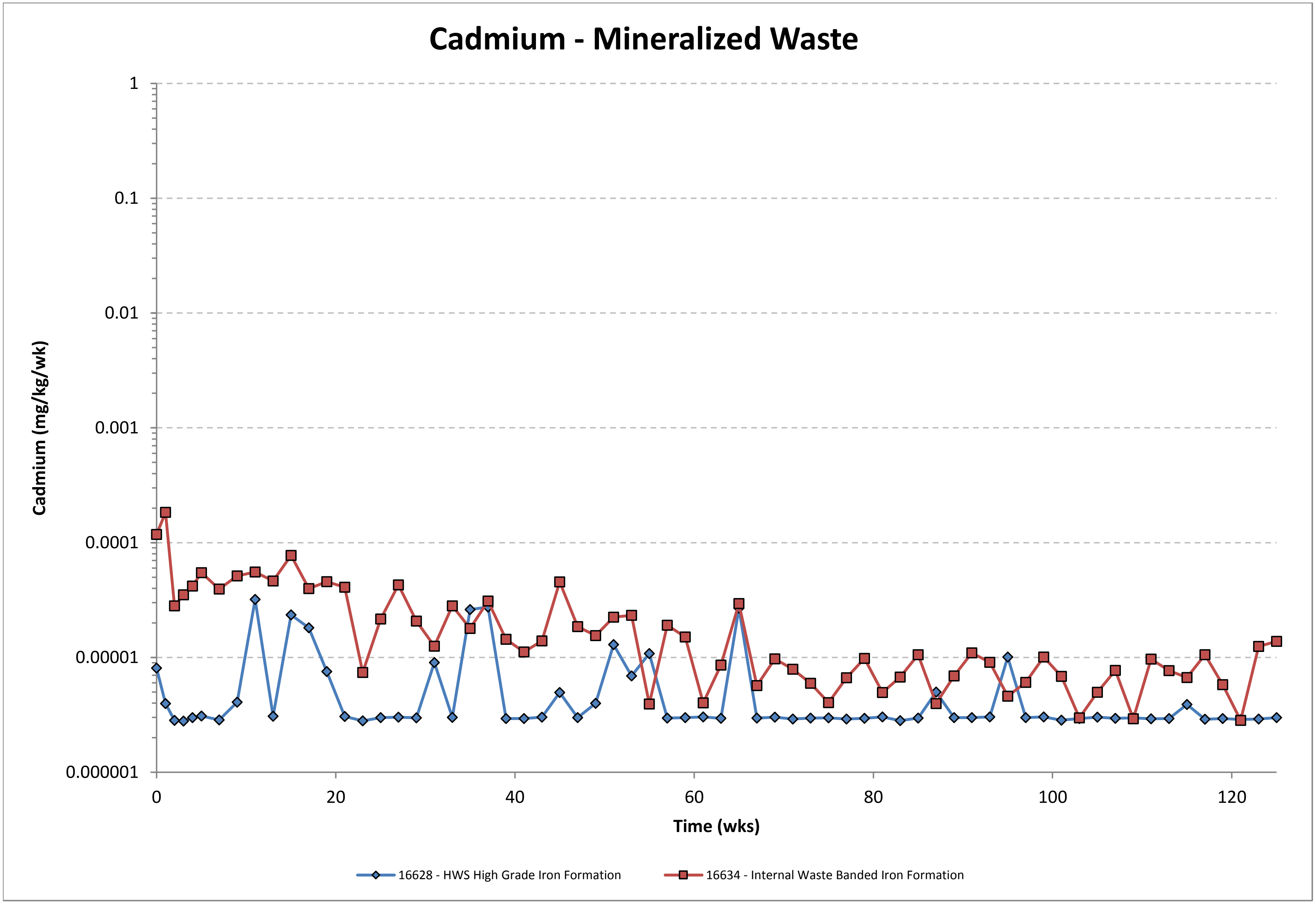
Boron - Mineralized Waste
1
0.1
0.01
0.001
0.0001
Boron (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



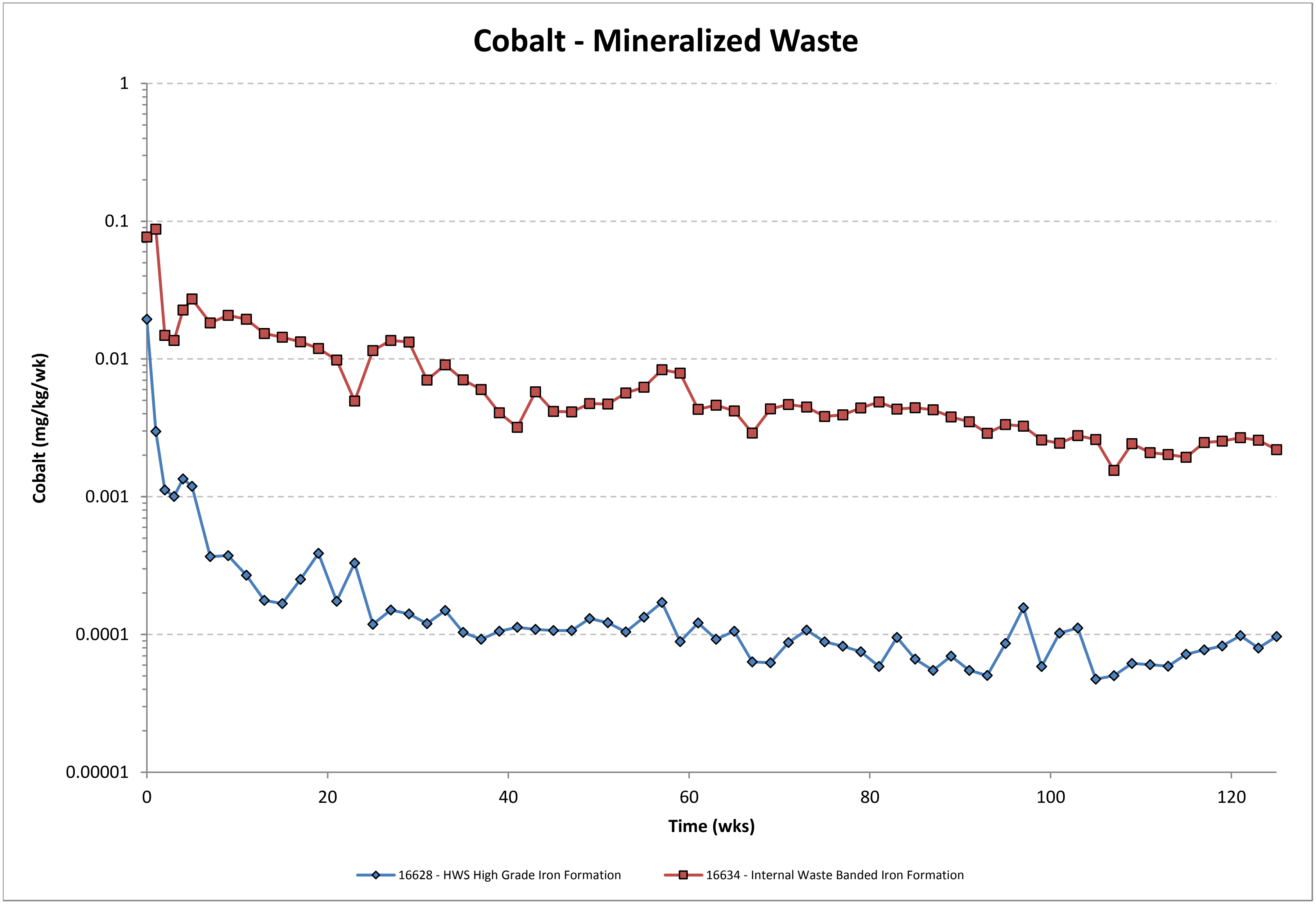
Bismuth - Mineralized Waste
Bismuth (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



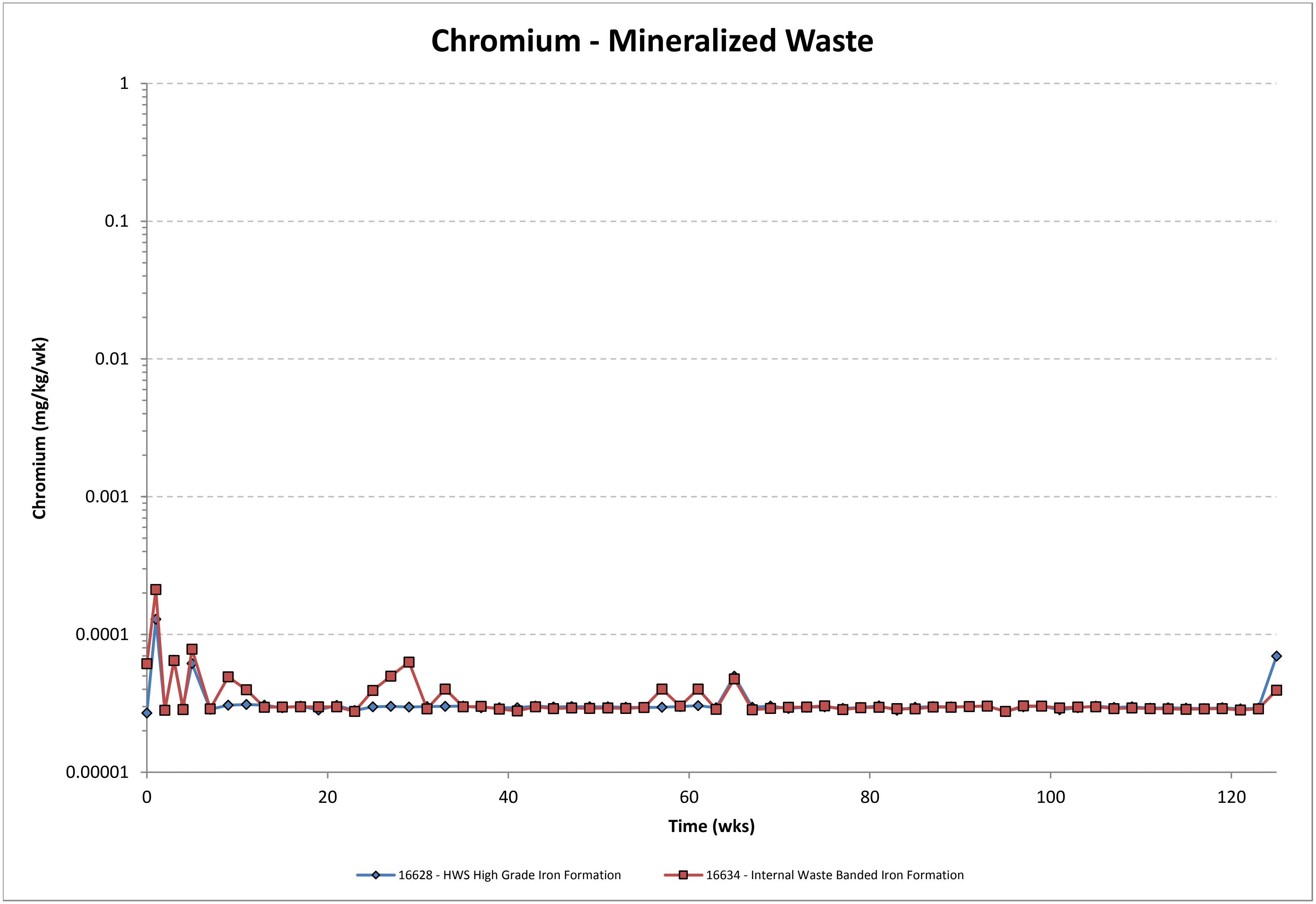
Calcium - Mineralized Waste
Calcium (mg/kg/wk)
100
10
1
0.1
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



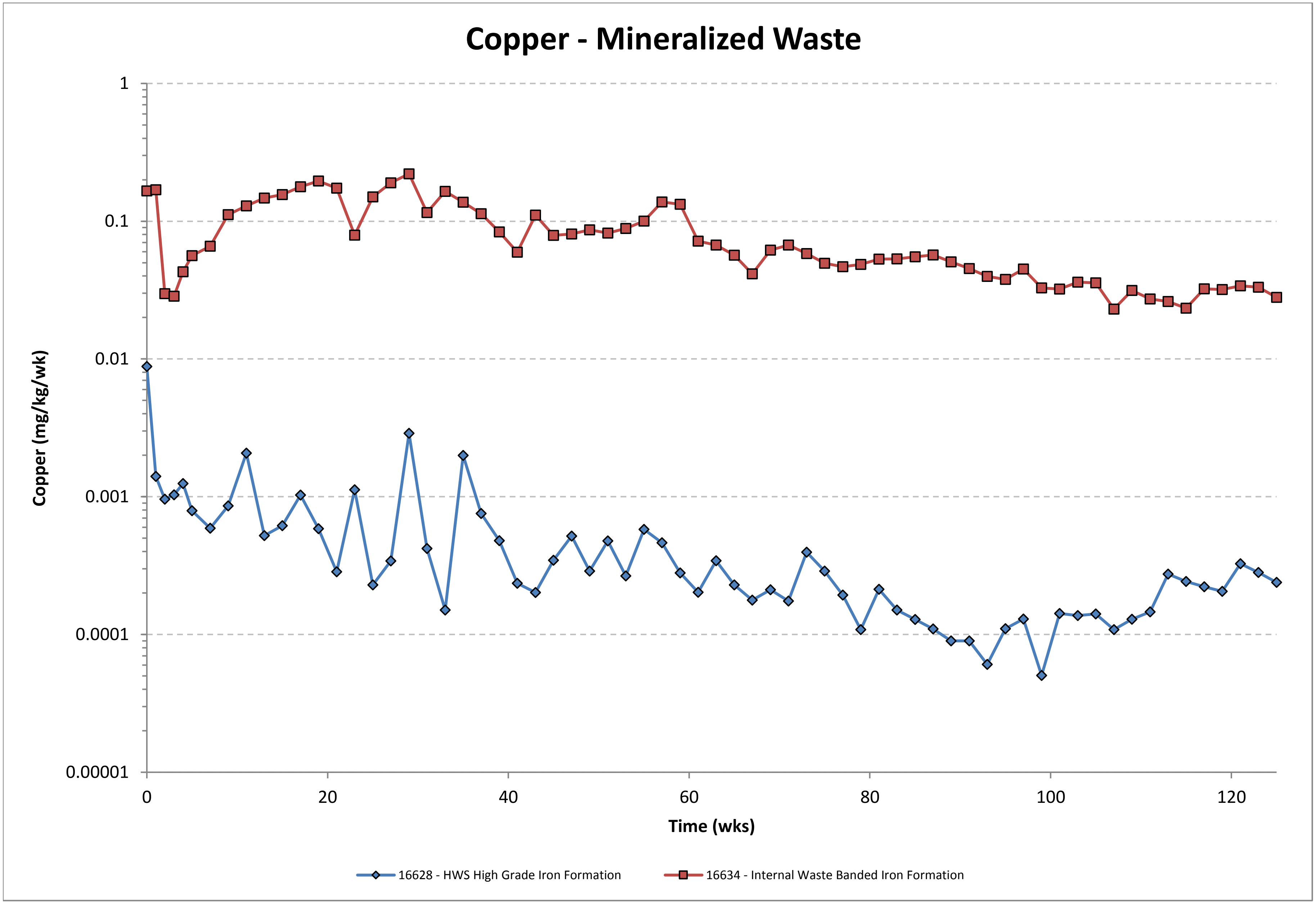
Cadmium - Mineralized Waste
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
Cadmium (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



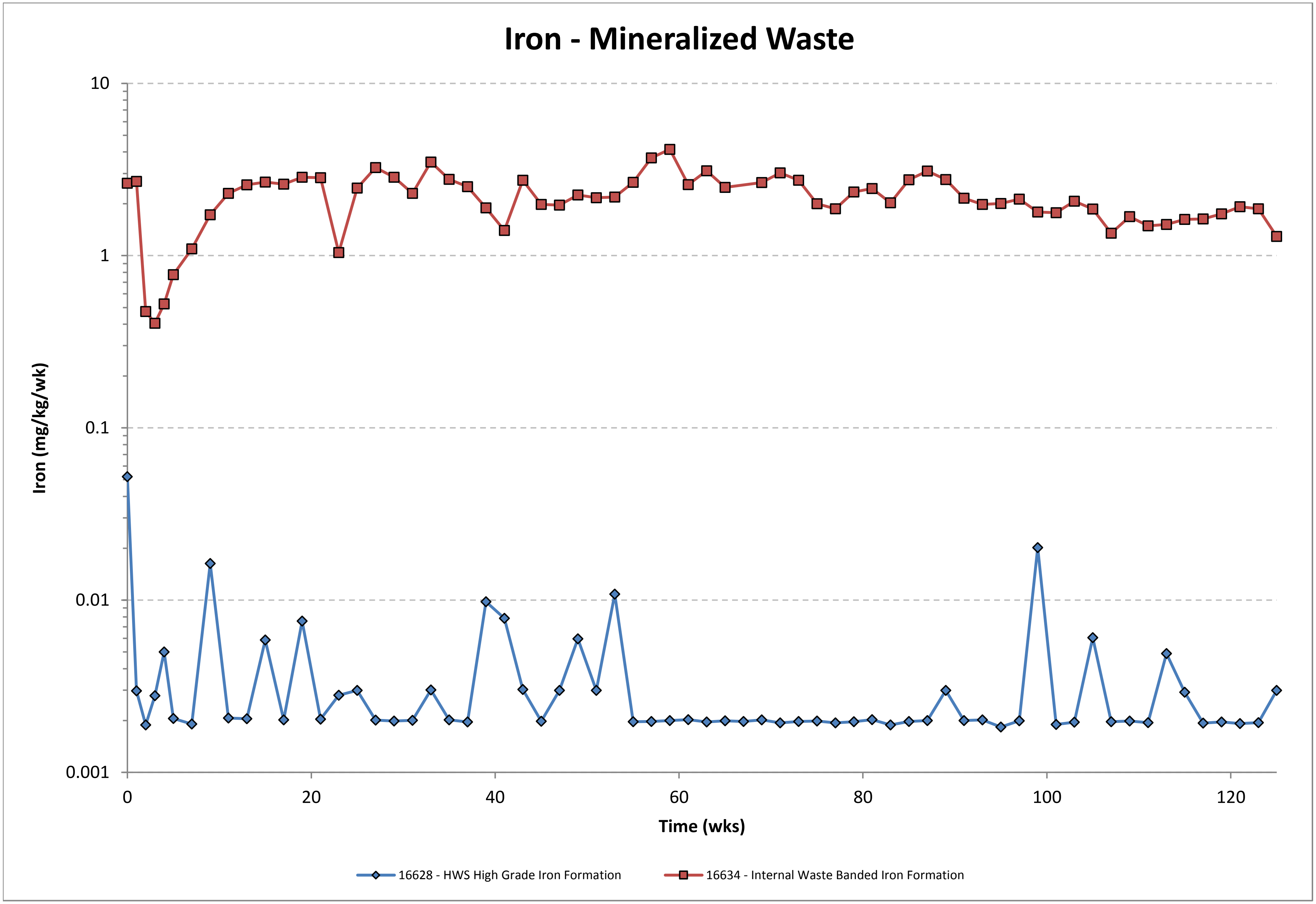
Cobalt - Mineralized Waste
Cobalt (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

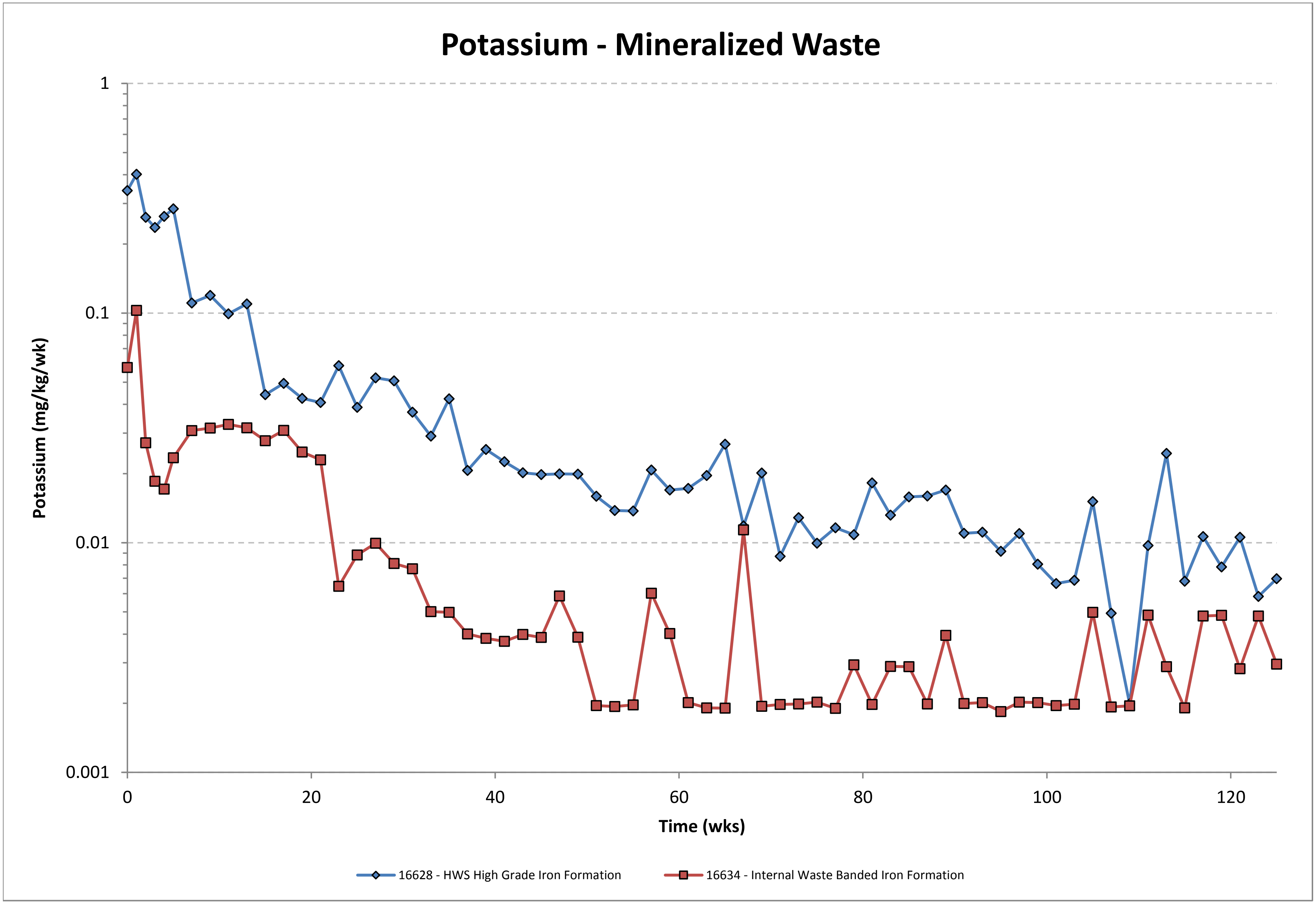


Chromium - Mineralized Waste
Chromium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

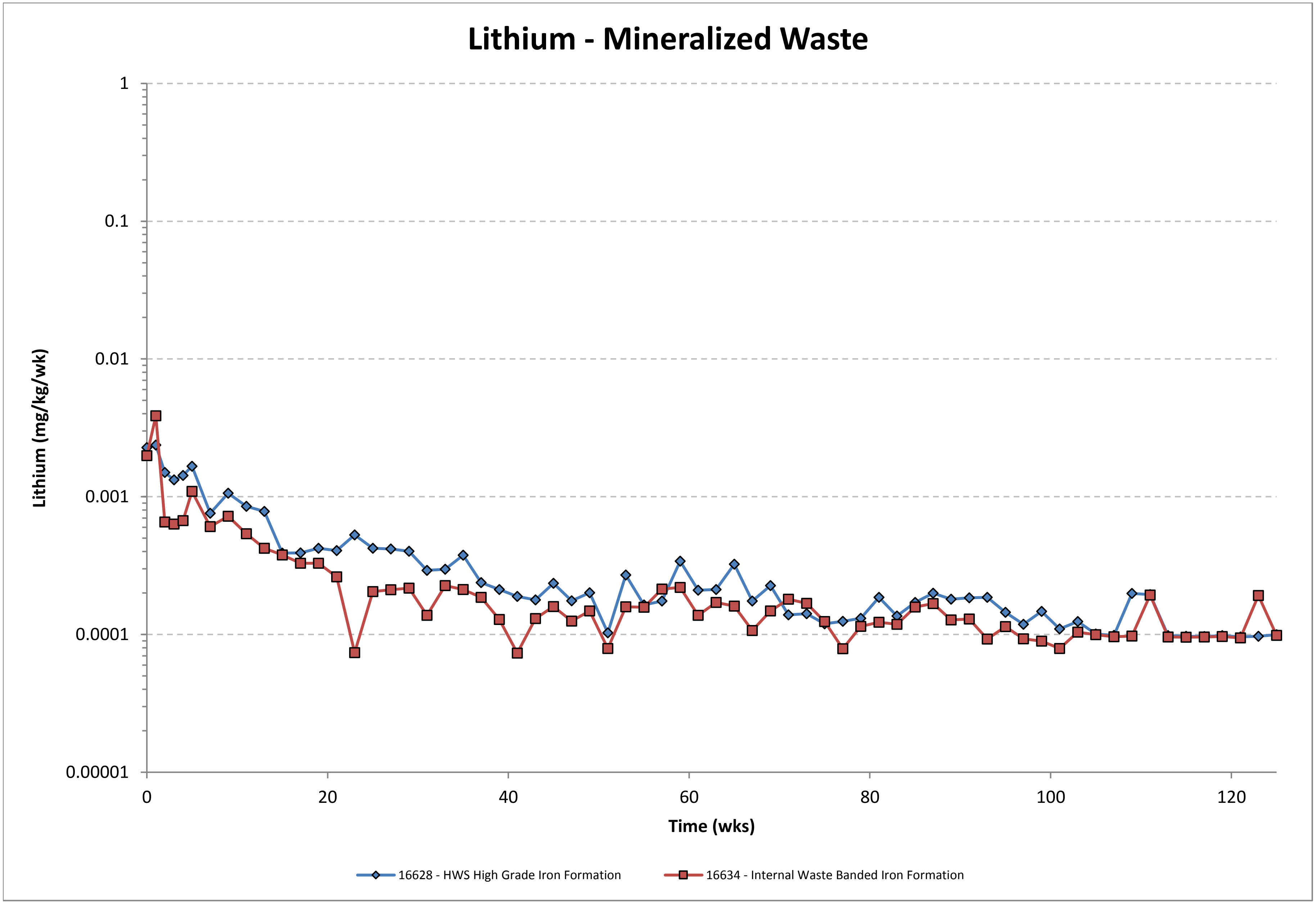


Copper - Mineralized Waste
1
0.1
0.01
0.001
0.0001
0.00001
Copper (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

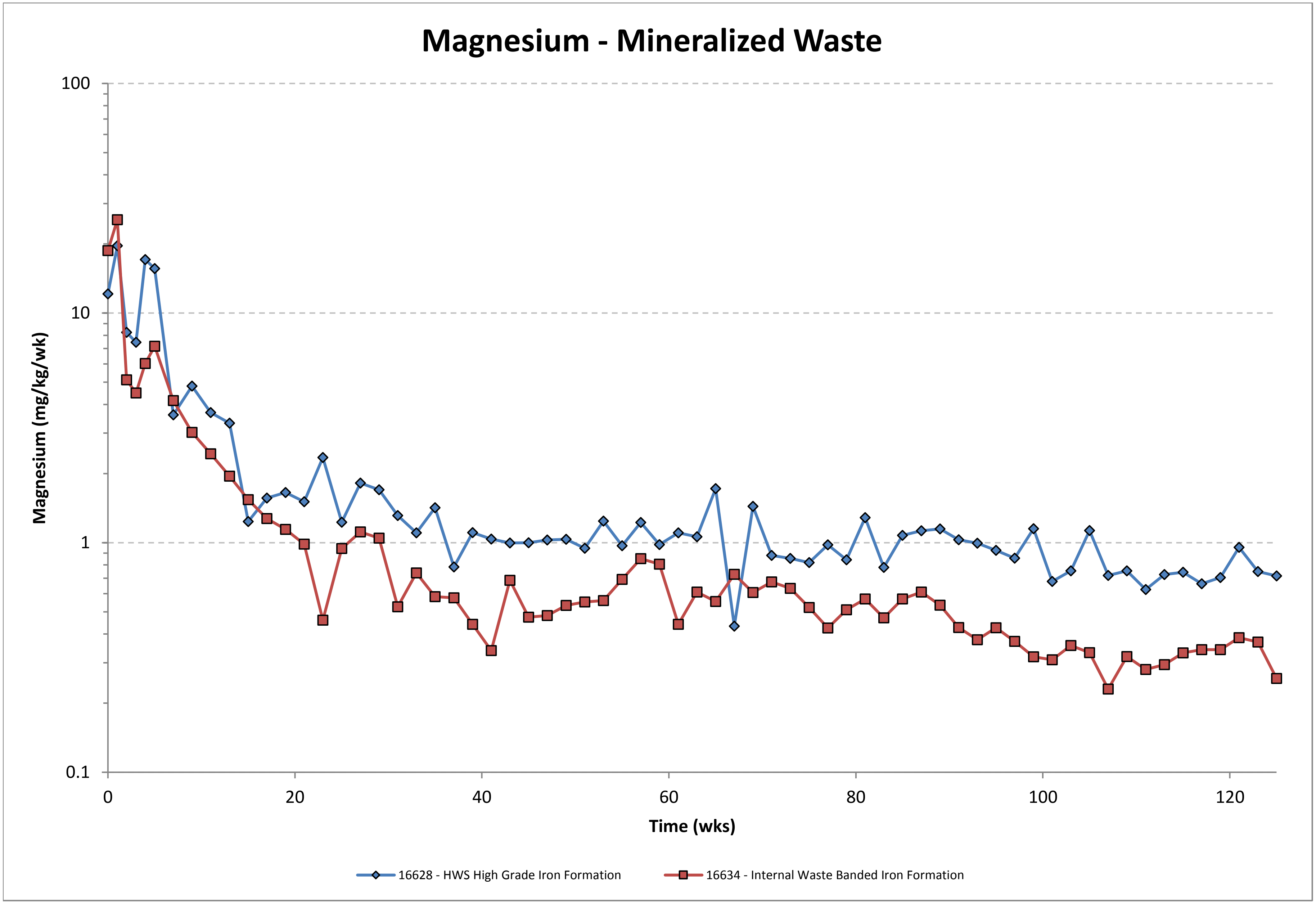

Iron - Mineralized Waste
10
1
0.1
0.01
0.001
Iron (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



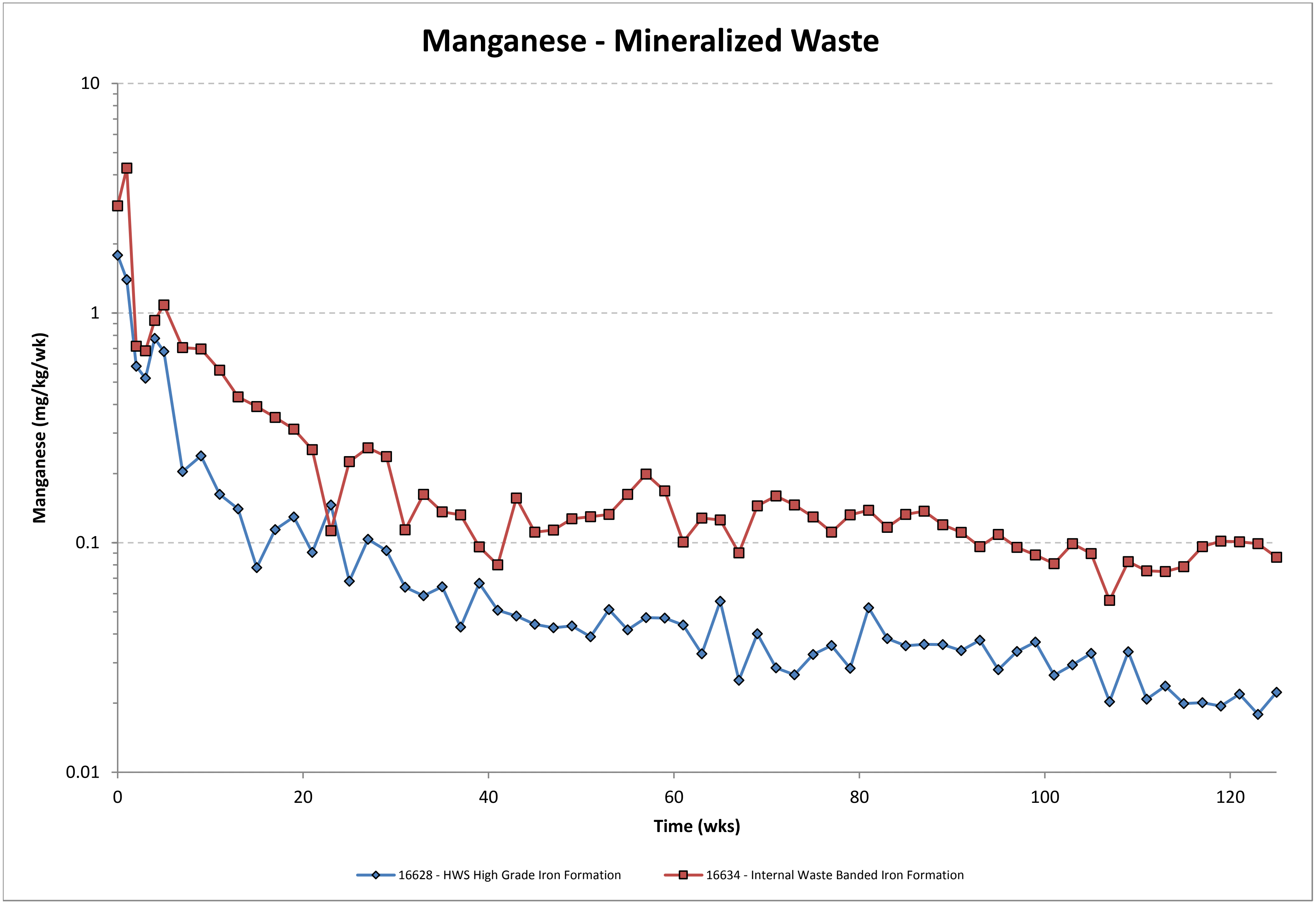
Potassium - Mineralized Waste
Potassium (mg/kg/wk)
1
0.1
0.01
0.001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



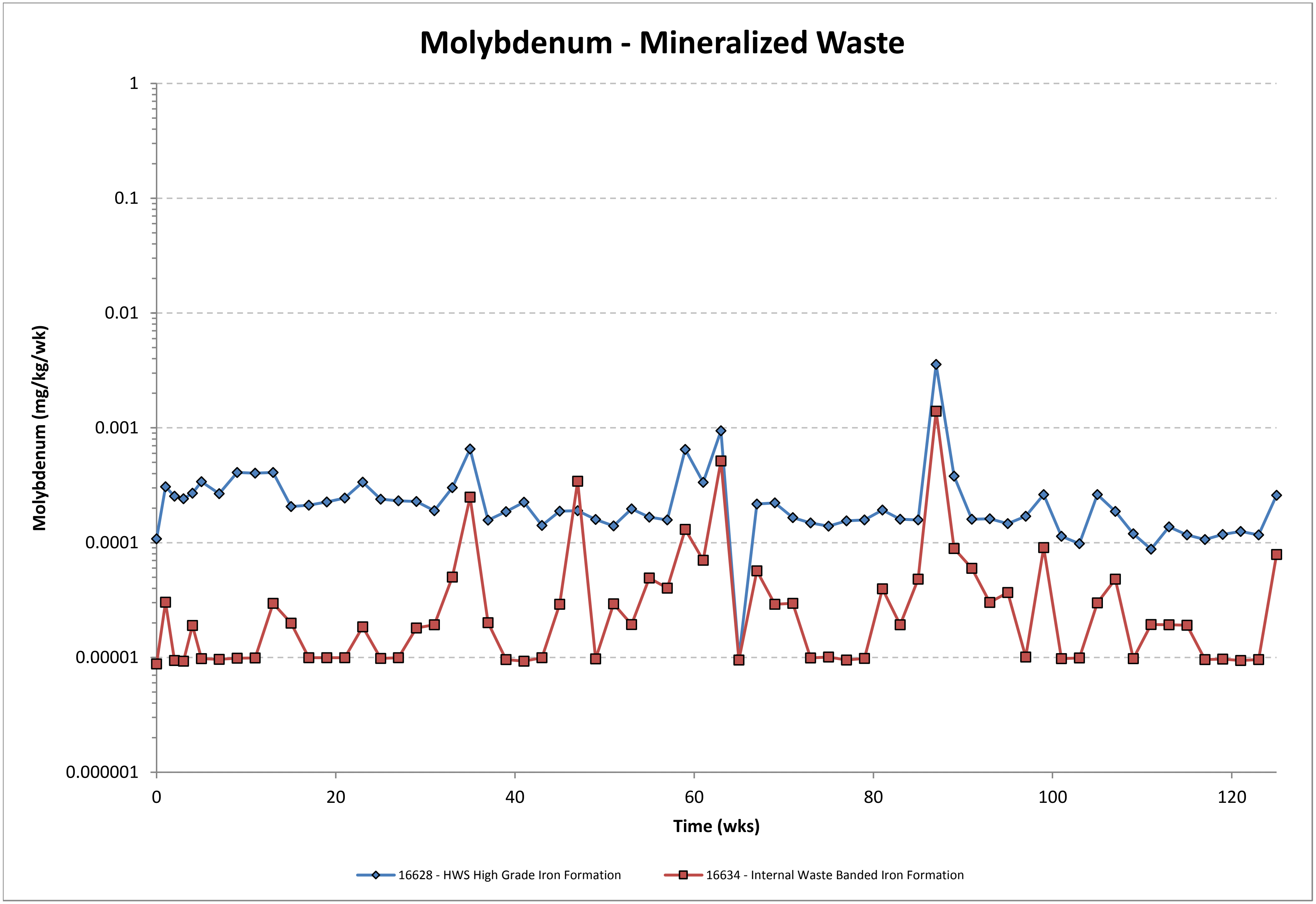
Lithium - Mineralized Waste
Lithium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



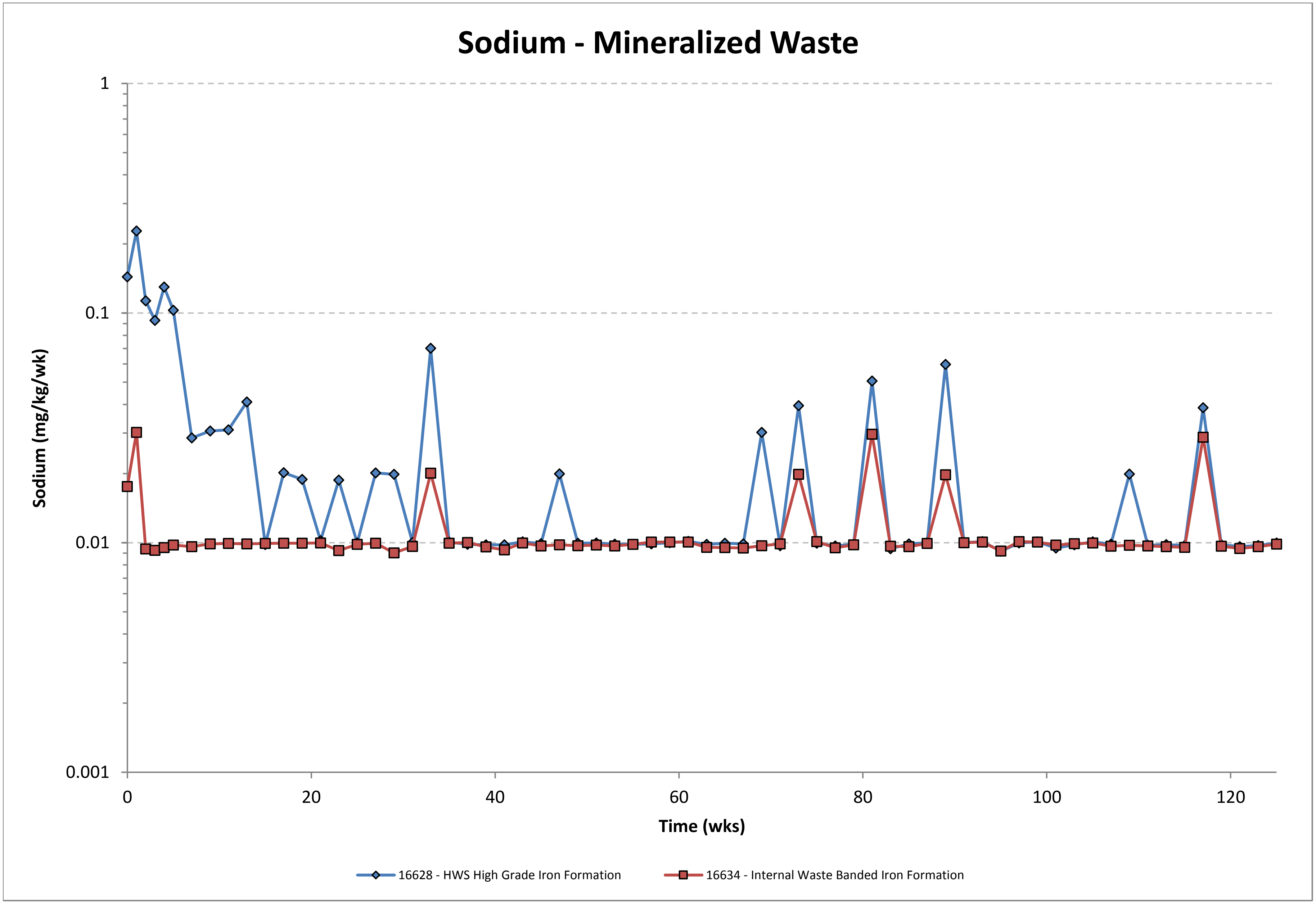
Magnesium - Mineralized Waste
Magnesium (mg/kg/wk)
100
10
1
0.1
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



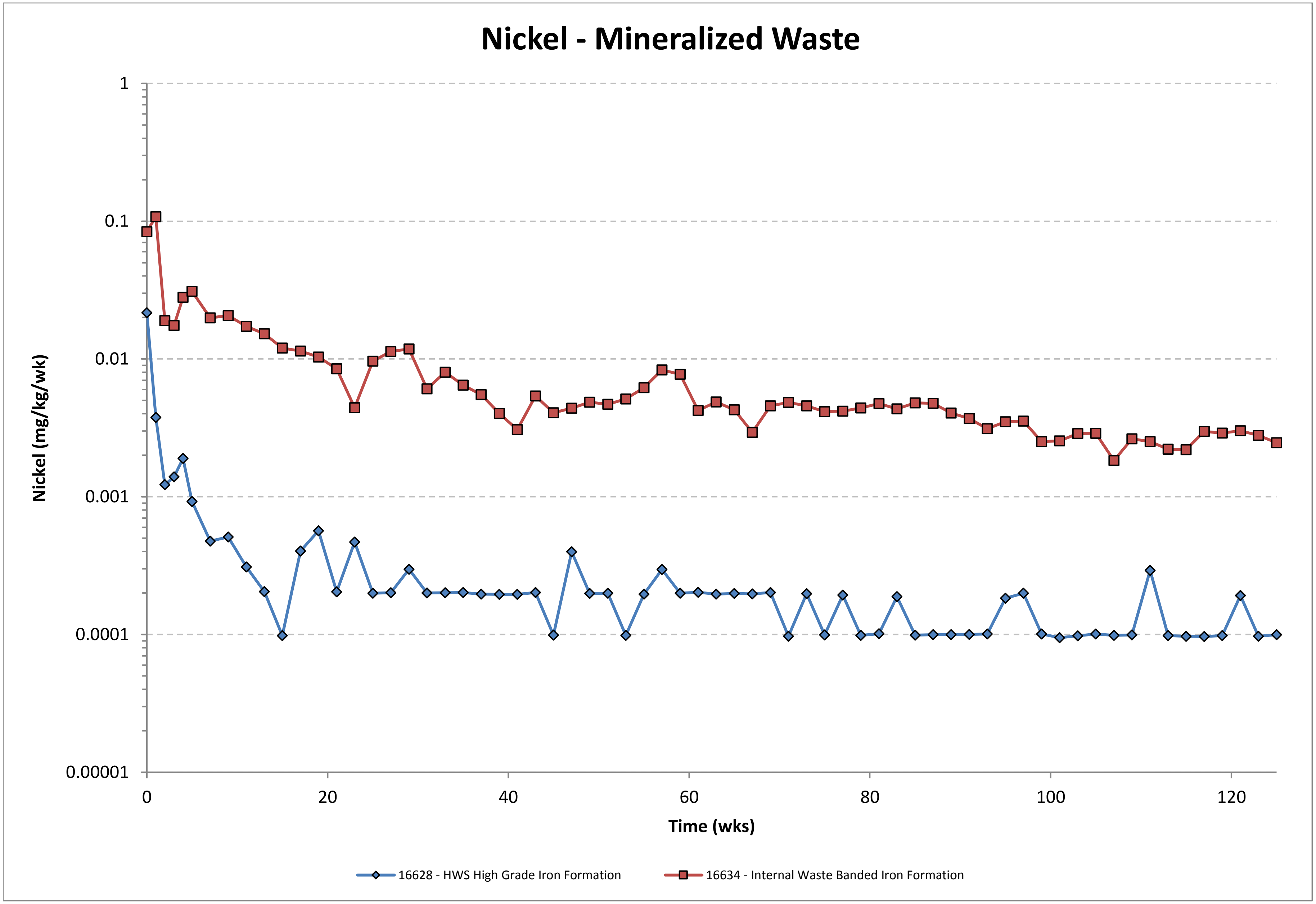
Manganese - Mineralized Waste
10
1
0.1
0.01
Manganese (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

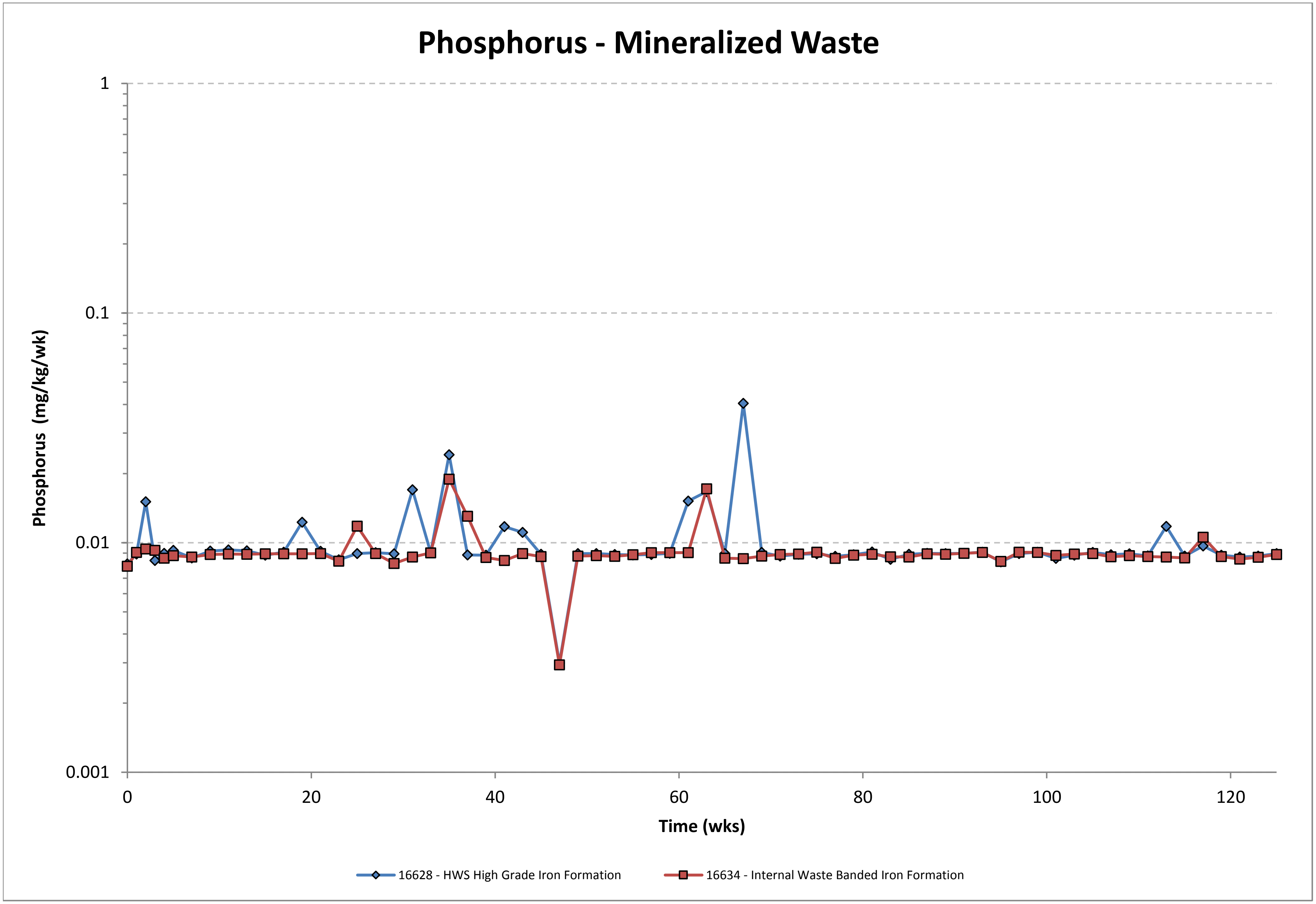


Molybdenum - Mineralized Waste
Molybdenum (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

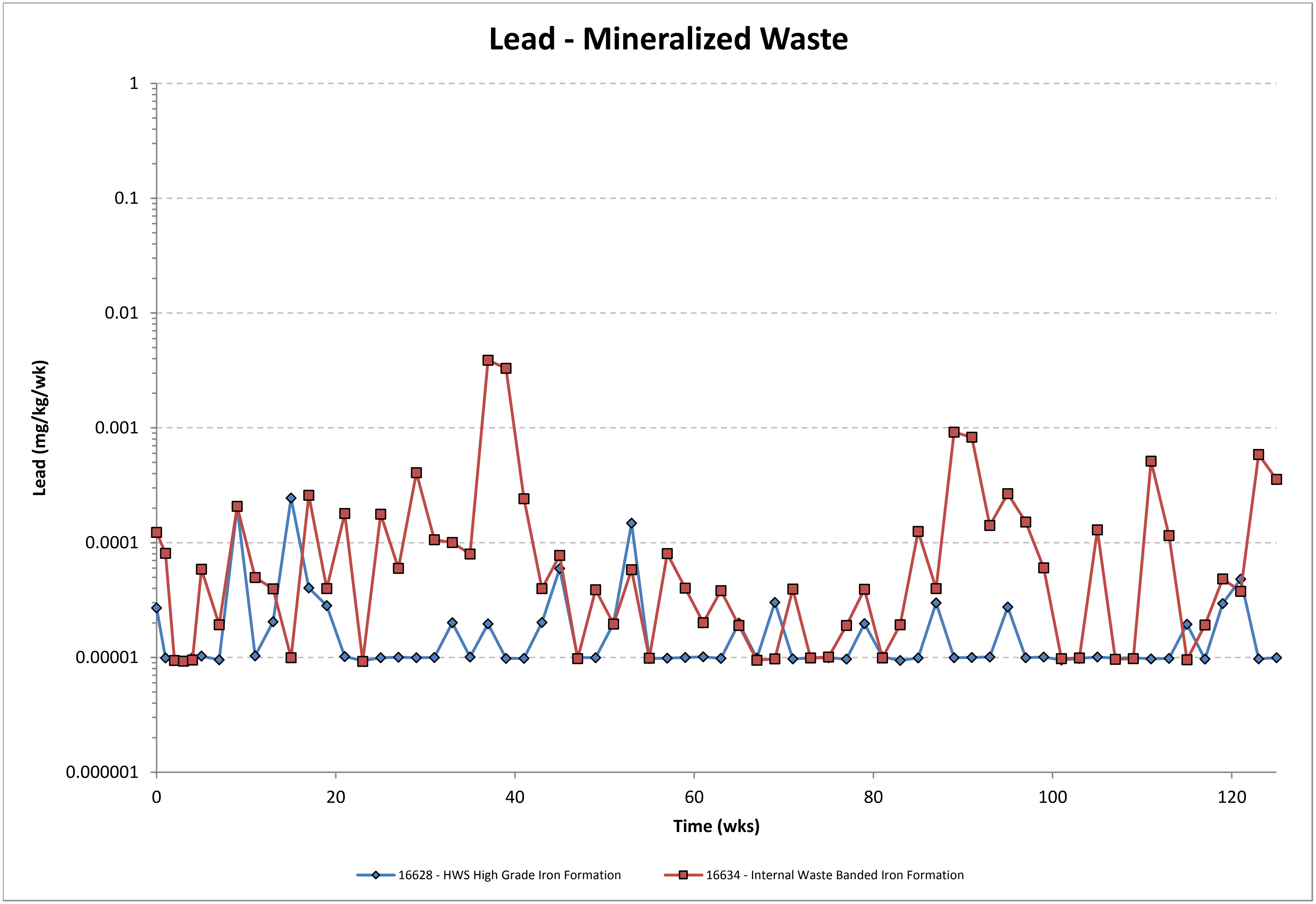


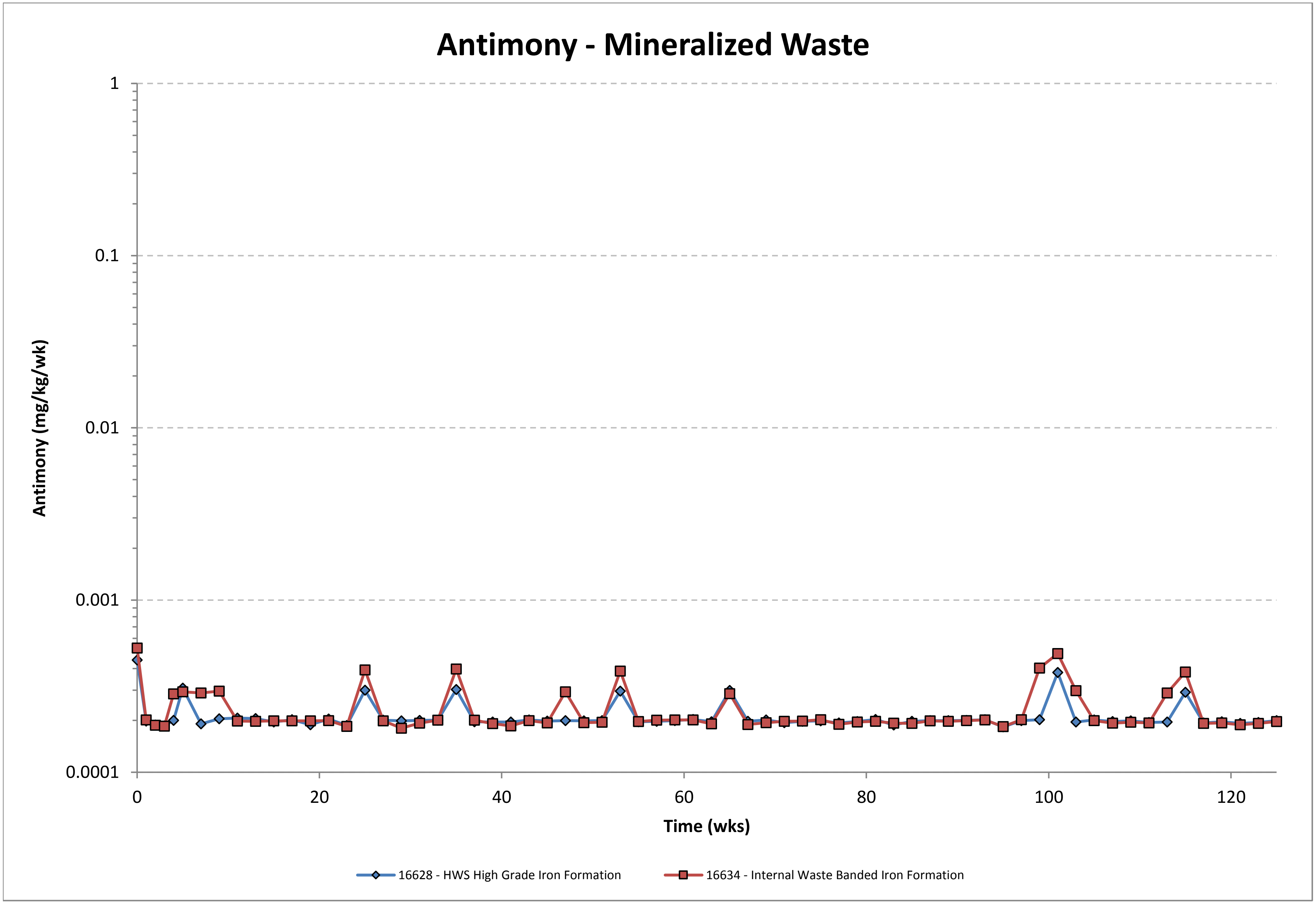
Sodium - Mineralized Waste
Sodium (mg/kg/wk)
1
0.1
0.01
0.001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation


Nickel - Mineralized Waste
1
0.1
0.01
0.001
0.0001
0.00001
Nickel (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

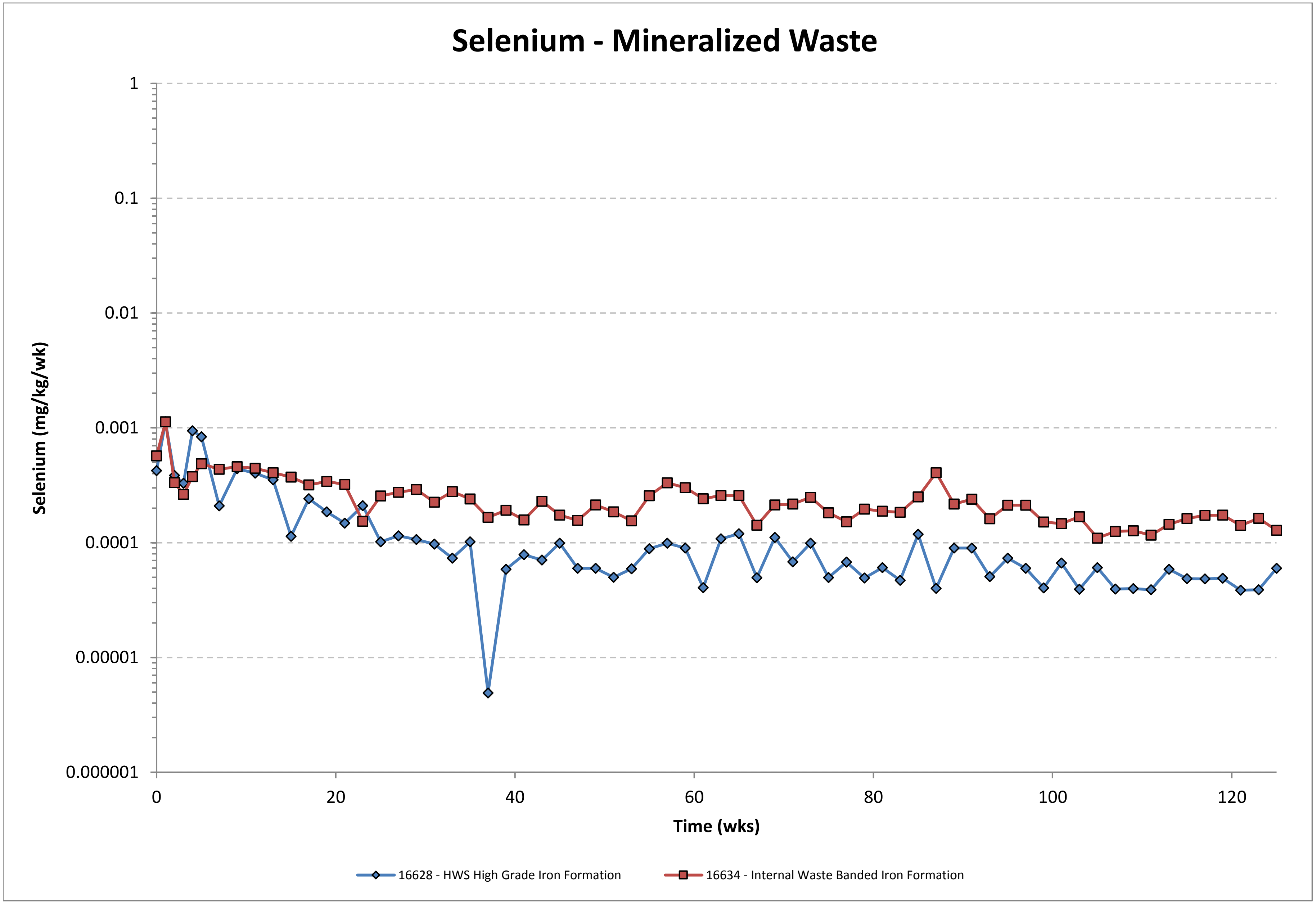


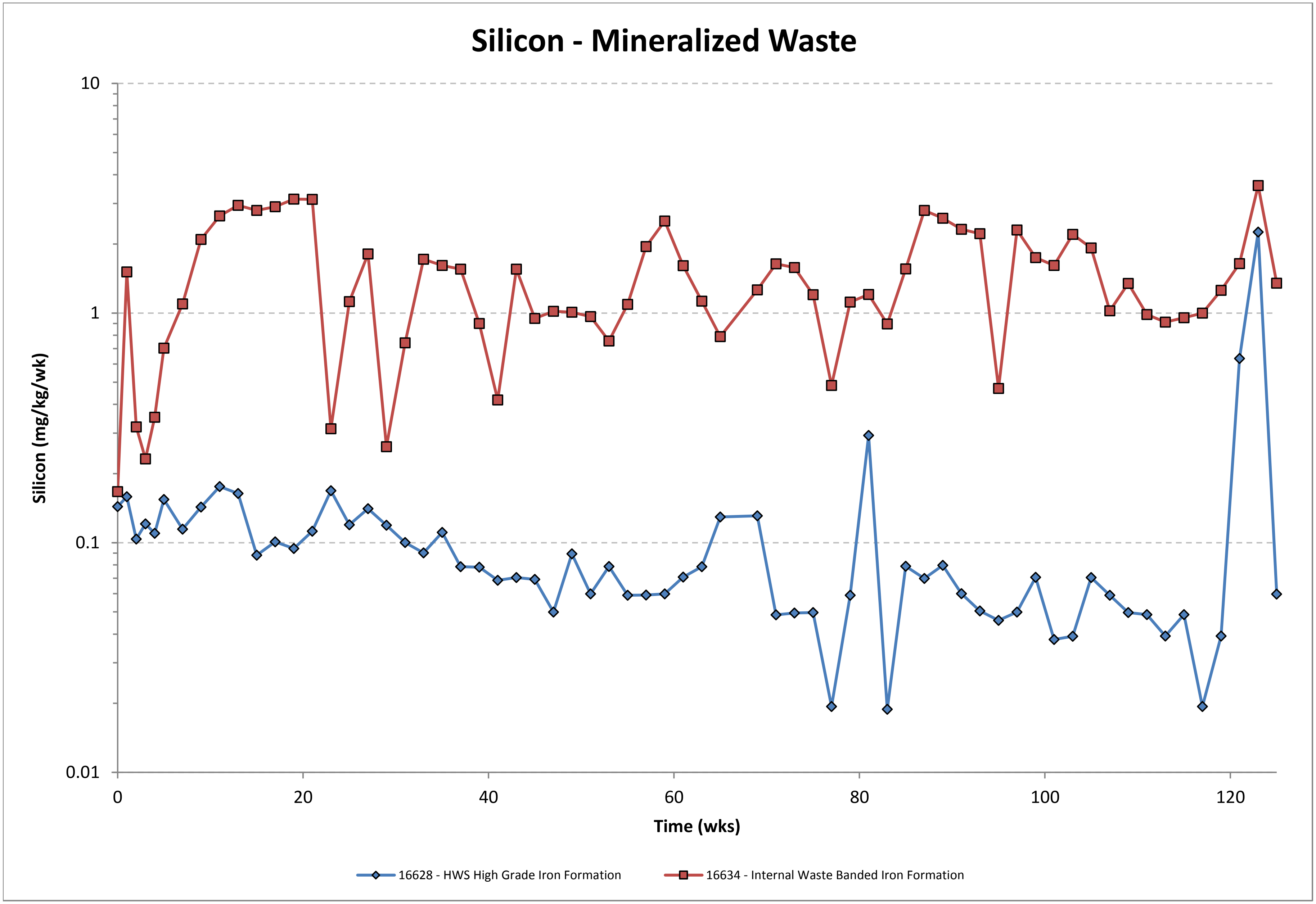
Phosphorus - Mineralized Waste
Phosphorus (mg/kg/wk)
1
0.1
0.01
0.001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation


Lead - Mineralized Waste
Lead (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

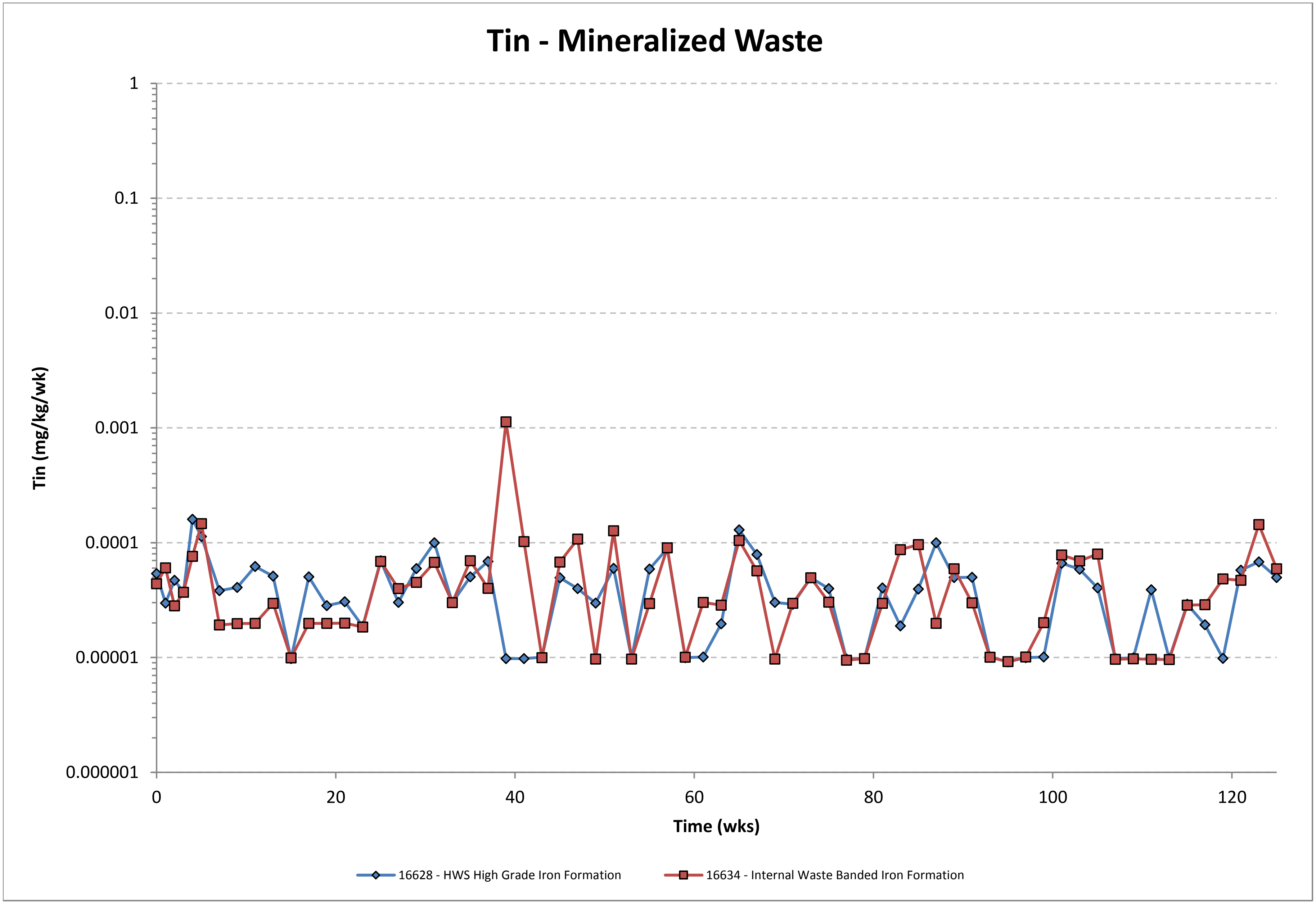


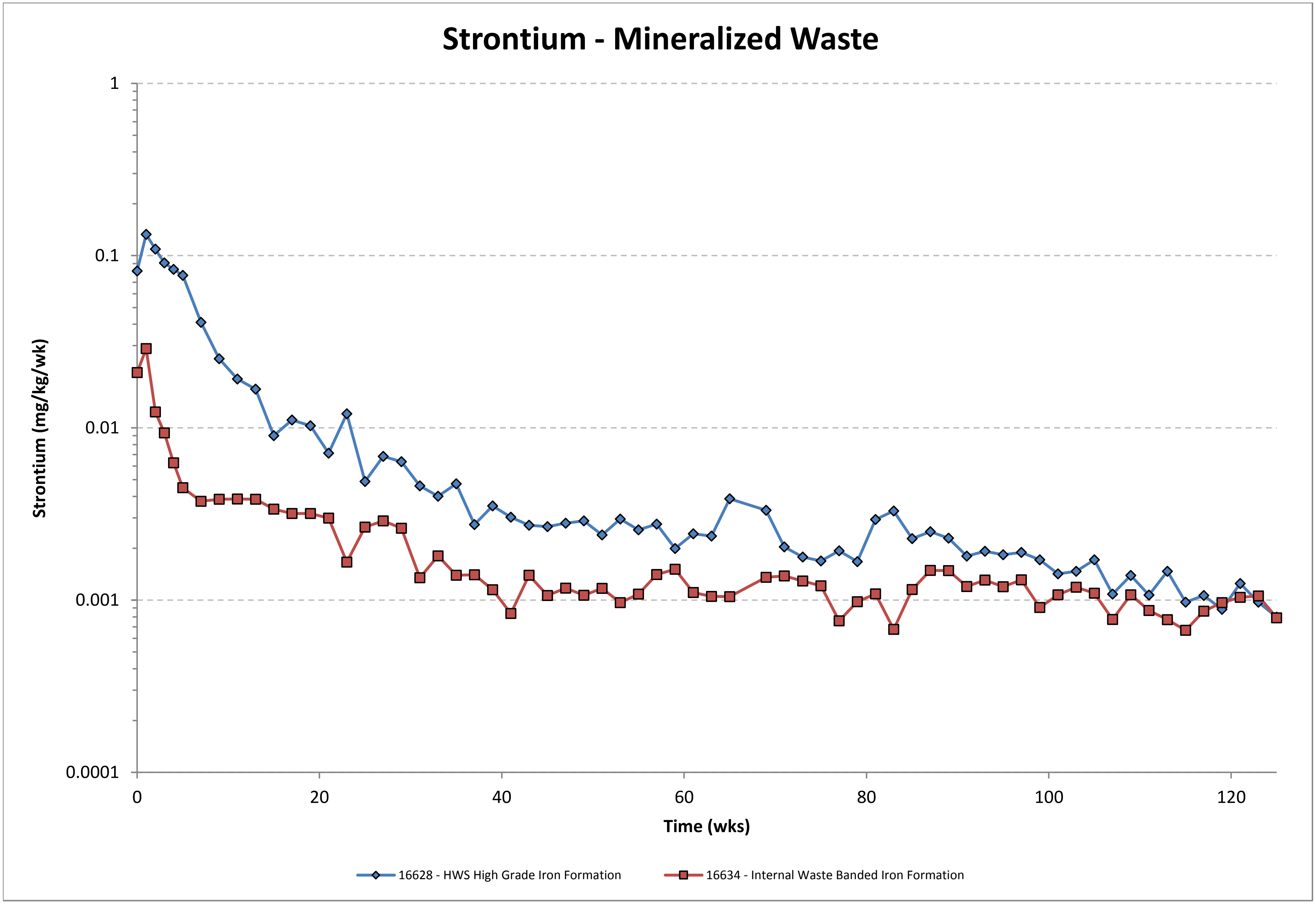
Antimony - Mineralized Waste
Antimony (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

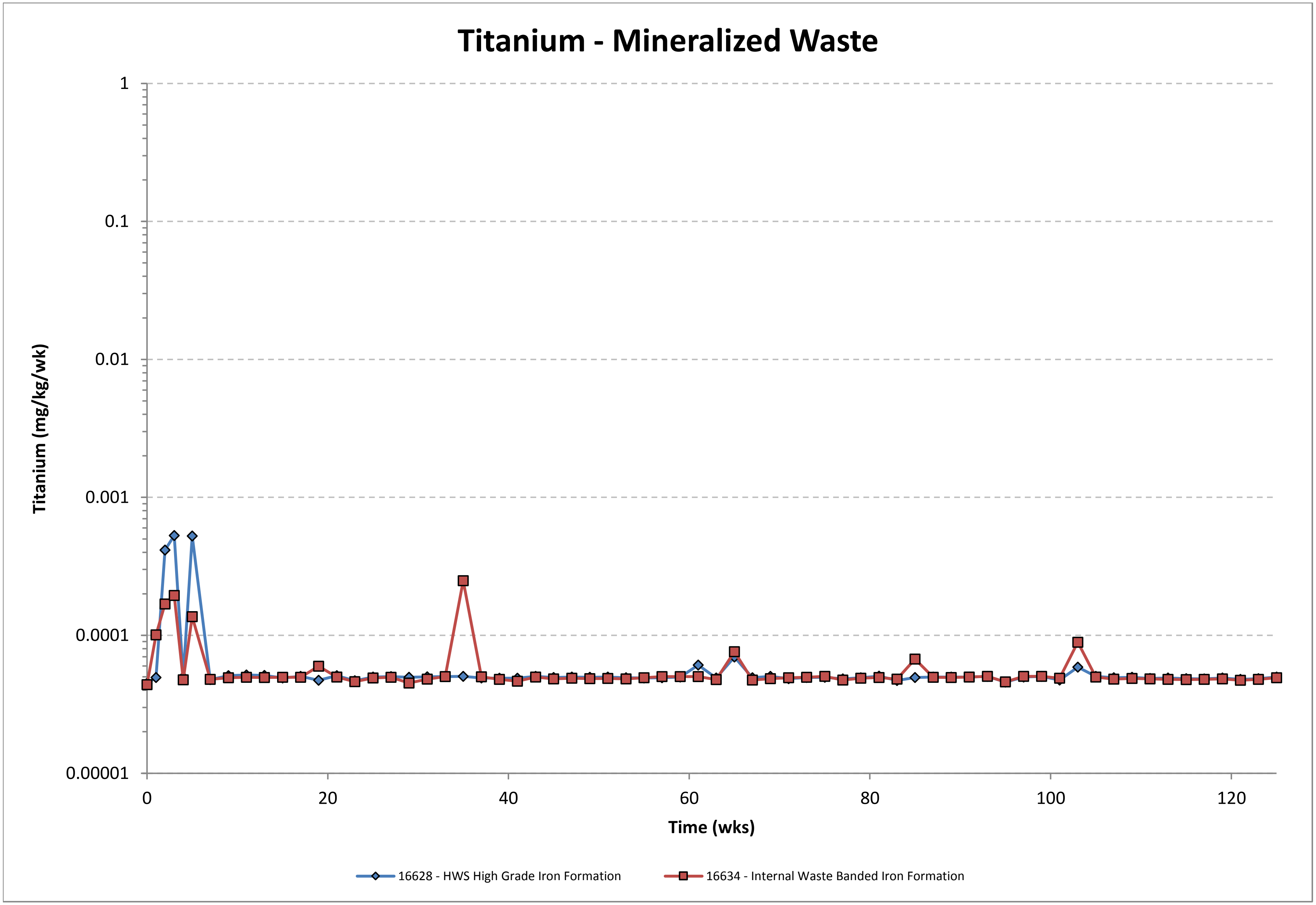

Selenium - Mineralized Waste
Selenium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



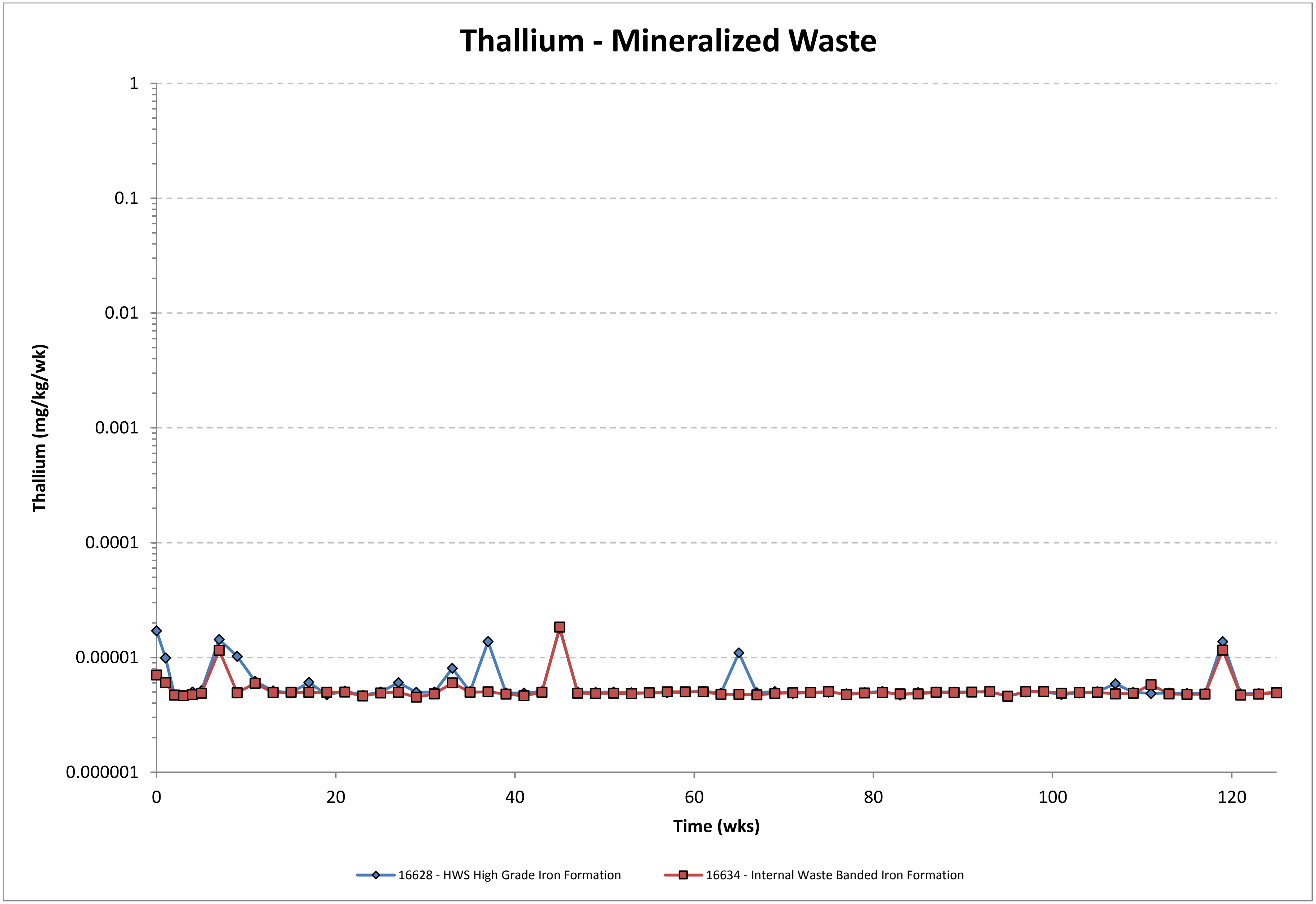
Silicon - Mineralized Waste
Silicon (mg/kg/wk)
10
1
0.1
0.01
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

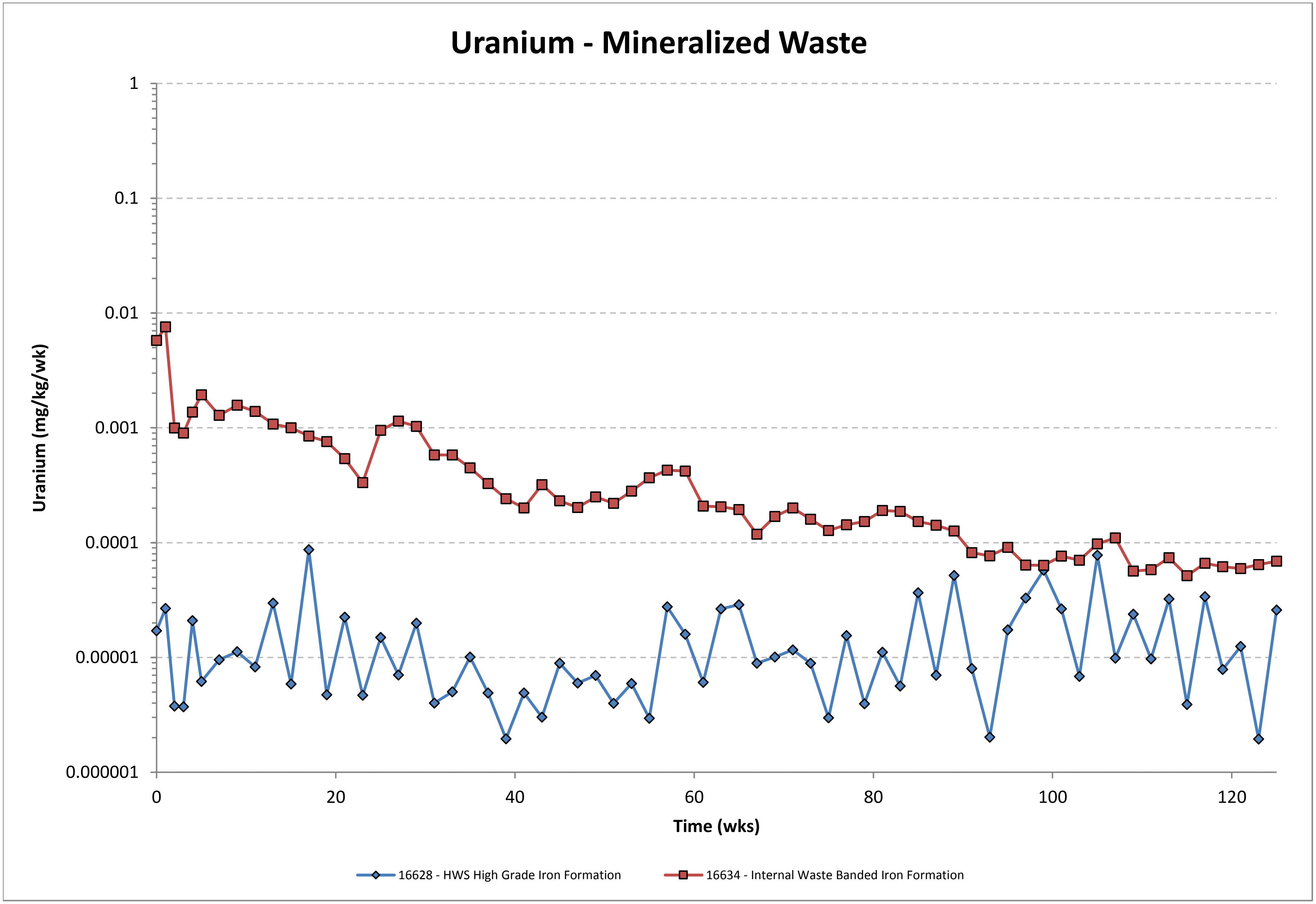

Tin - Mineralized Waste
Tin (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

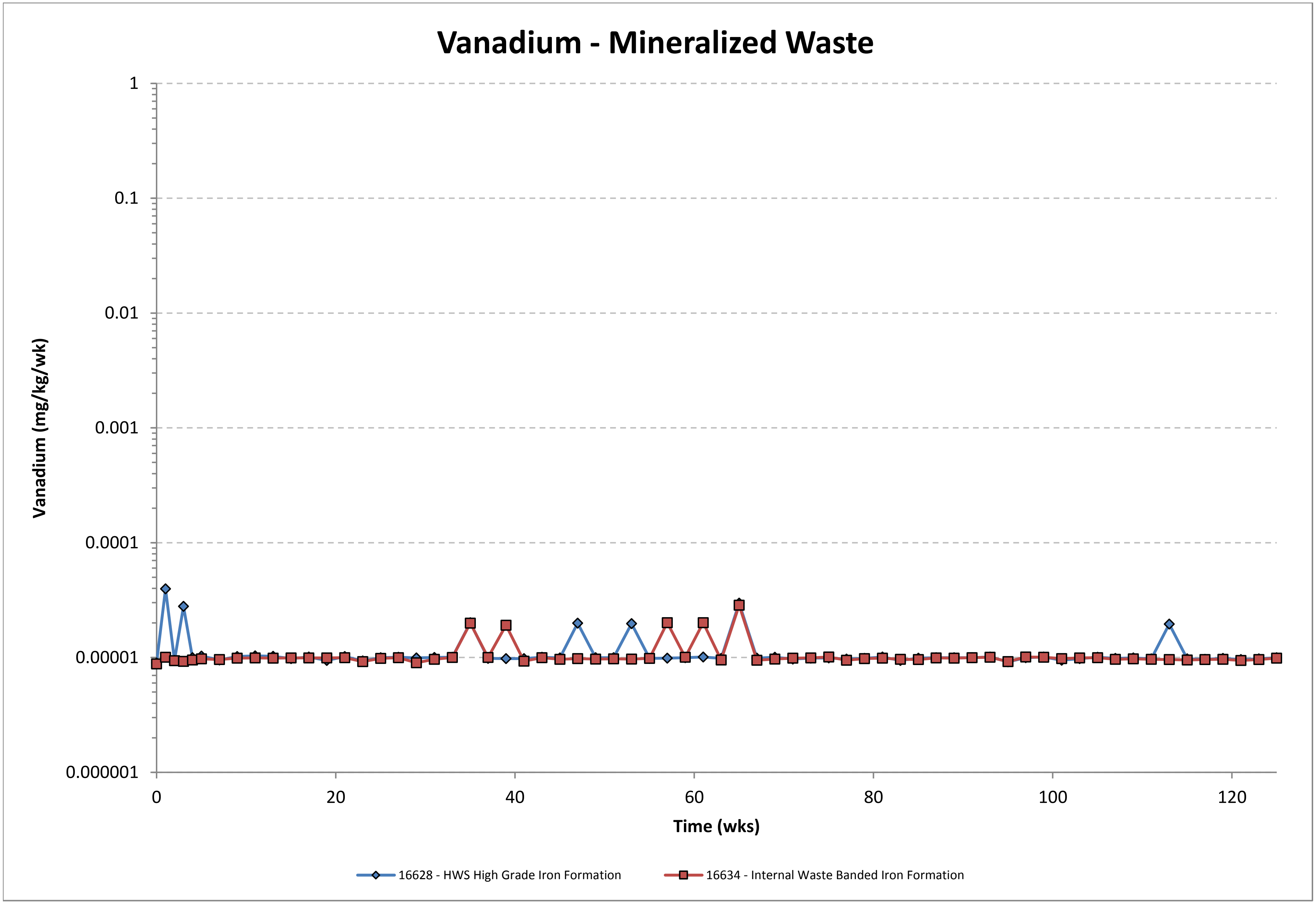

Strontium - Mineralized Waste
Strontium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



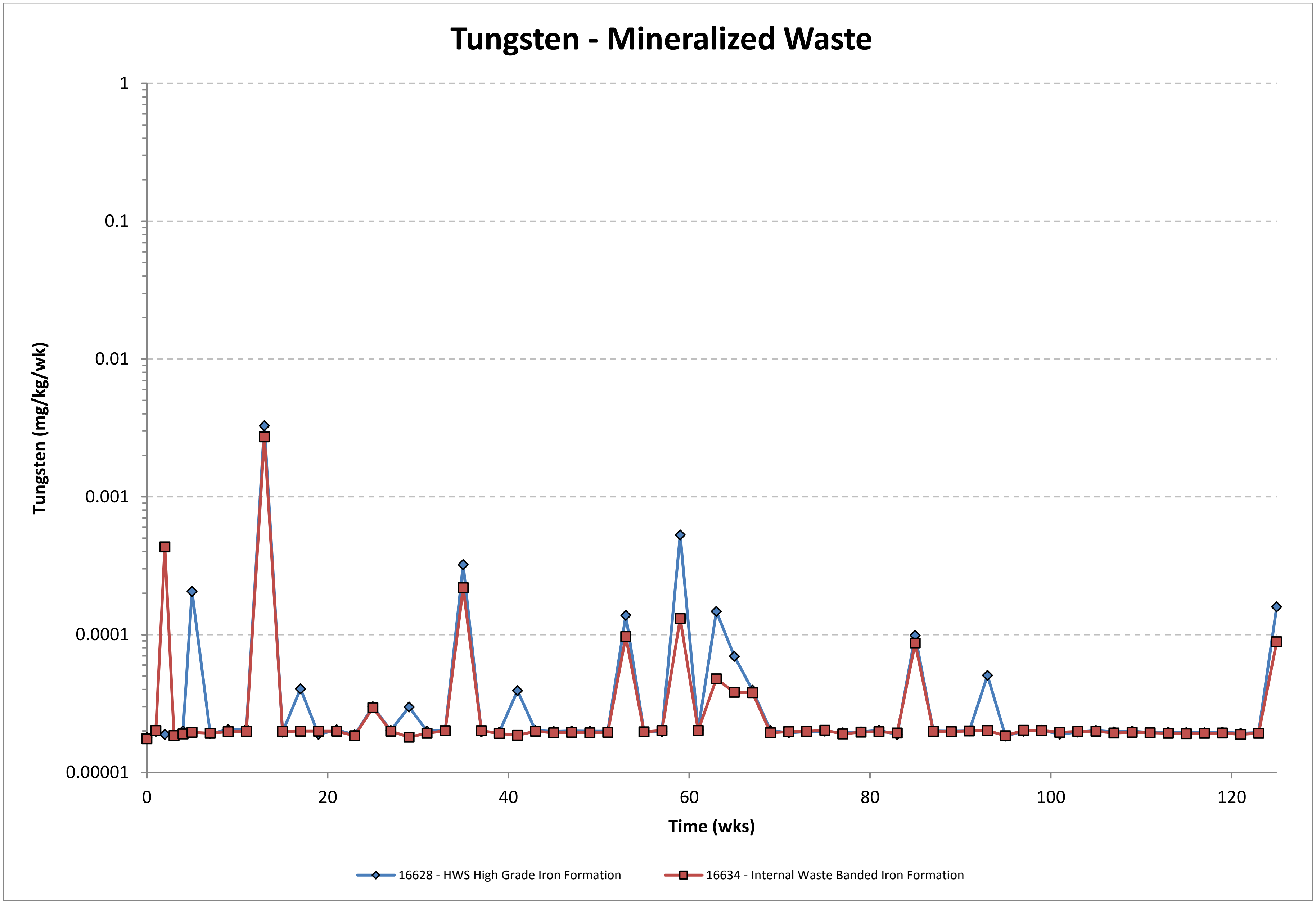
Titanium - Mineralized Waste
Titanium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation


Thallium - Mineralized Waste
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
Thallium (mg/kg/wk)
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

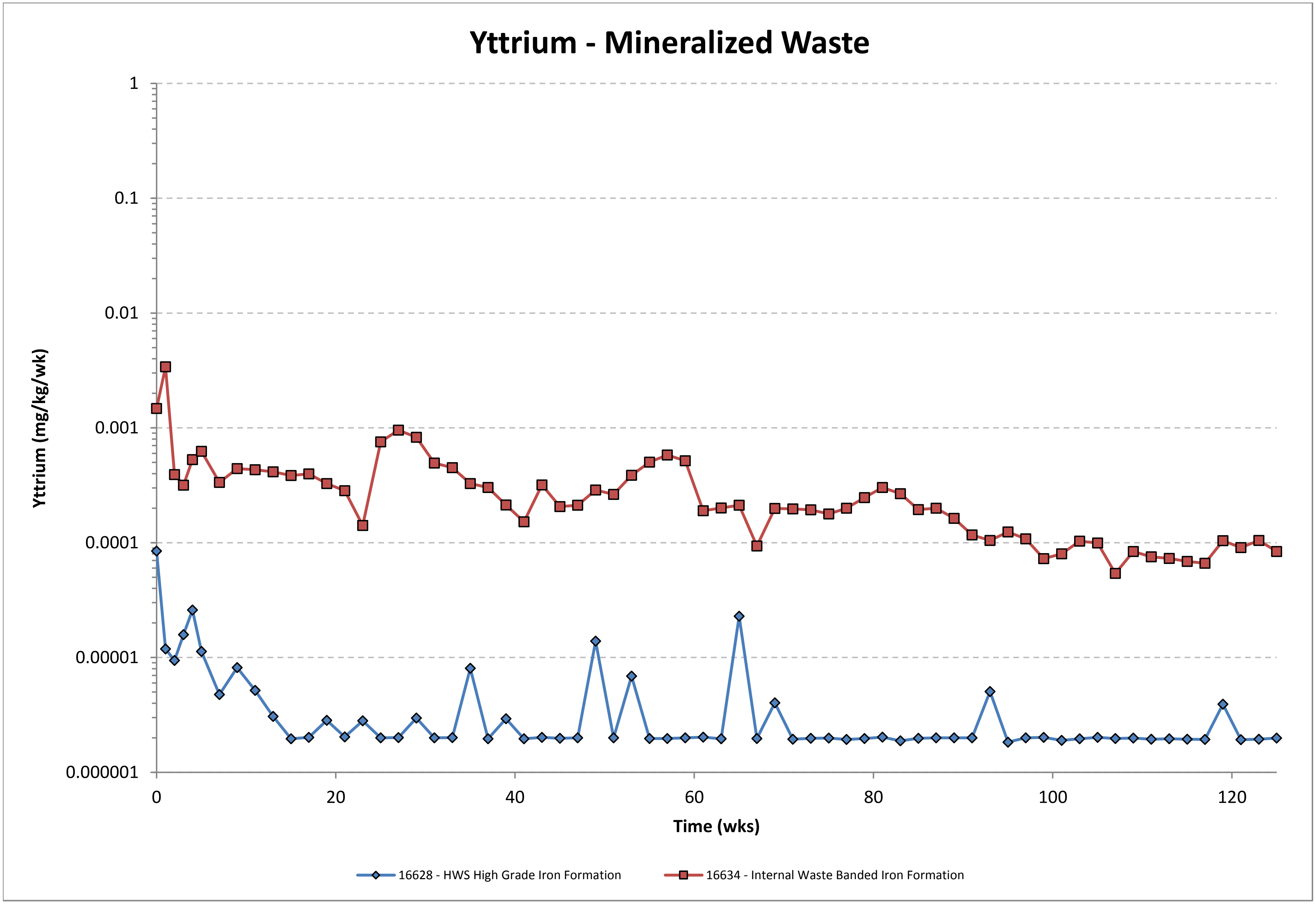

Uranium - Mineralized Waste
Uranium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



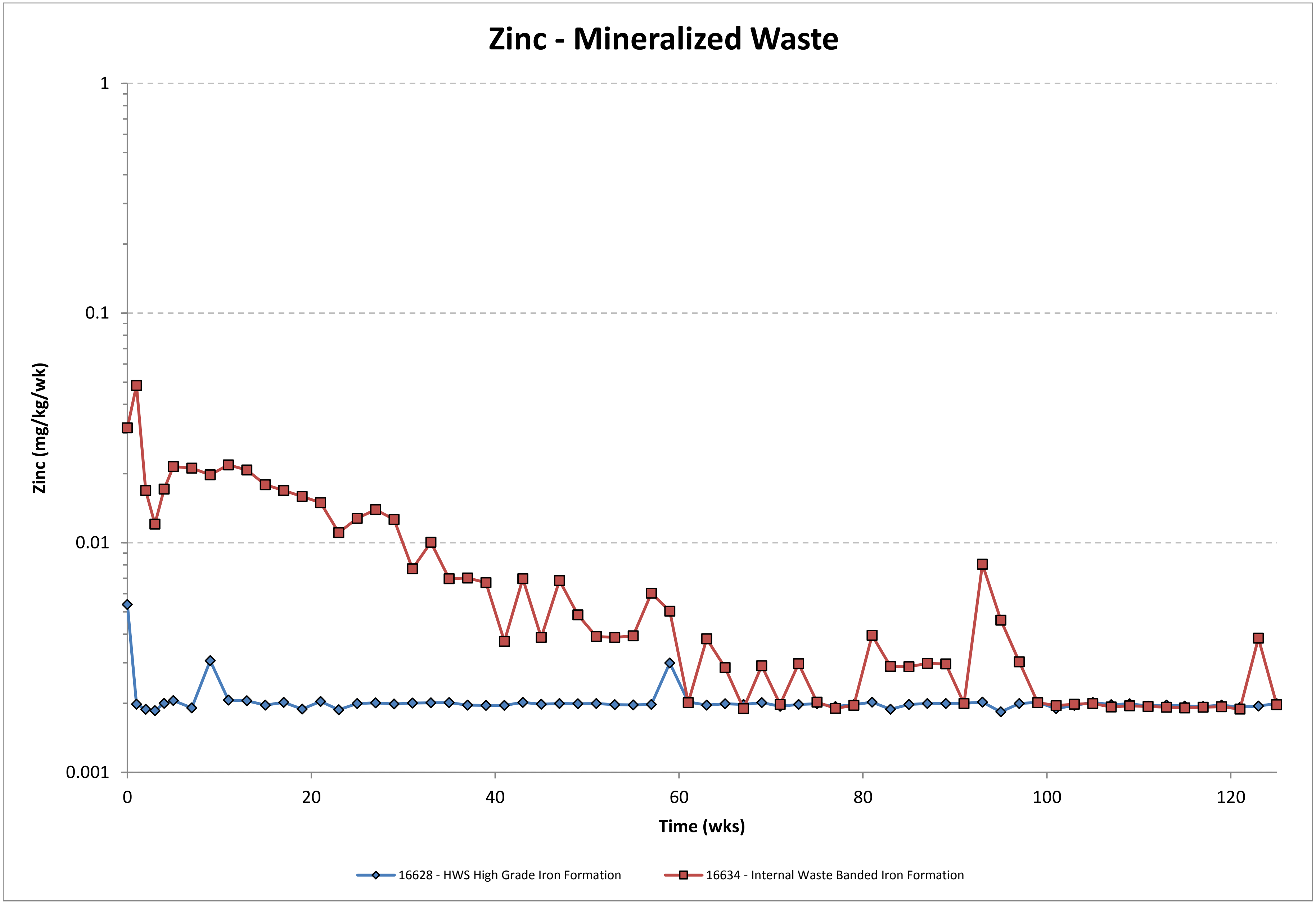
Vanadium - Mineralized Waste
Vanadium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



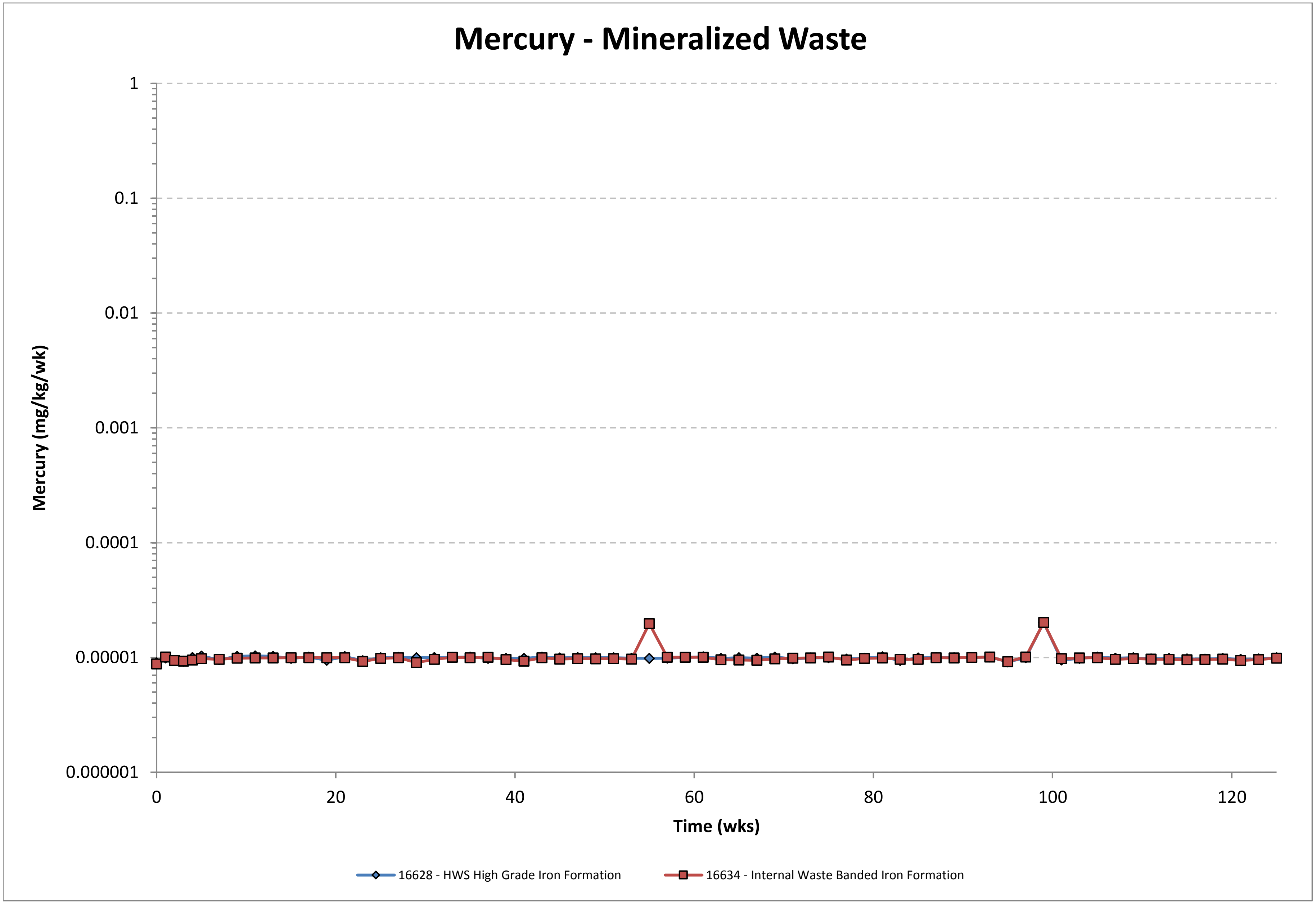
Tungsten - Mineralized Waste
Tungsten (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



Yttrium - Mineralized Waste
Yttrium (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation



Zinc - Mineralized Waste
Zinc (mg/kg/wk)
1
0.1
0.01
0.001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation


Mercury - Mineralized Waste
Mercury (mg/kg/wk)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0
20
40
60
80
100
120
Time (wks)
16628 - HWS High Grade Iron Formation
16634 - Internal Waste Banded Iron Formation

APPENDIX D.6

QUARRY GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS

Baffinland

TABLE D.6.1
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
QUARRY QMR2 GEOCHEMISTRY ANALYTICAL SAMPLING
RESULTS FOR 2016
SUMMARY STATISTICS

	Fizz Rating	NP	MPA	MNP	(NP:MNP)	C (%)	S (%)
		t CaCO3/1000t	t CaCO3/1000t	t CaCO3/1000t			
COUNT	1	1	1	1	1	18	18
MIN	1	15	8.4	7	1.78	0.005	0.005
MAX	1	15	8.4	7	1.78	0.21	0.27
MEAN	1	15	8.4	7	1.78	0.054	0.042

Baffinland

TABLE D.6.1.1
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
QUARRY QMR2 GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED QUARRY ROCK

YEAR	Location	Bench	Blast ID	ALS Assay #	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	CLASS
2016	QMR2	190	QMR2 1190 023	R766645	2303						0.005	0.005	7914256.51	560147.113	188.5	1.5	NAG
2016	QMR2	190	QMR2 1190 023	R766646	2215						0.005	0.06	7914216.72	560153.898	188.5	1.5	NAG
2016	QMR2	190	QMR2 1190 023	R766647	1805						0.005	0.005	7914247.92	560133.449	199.585	9.585	NAG
2016	QMR2	190	QMR2 1190 023	R766648	2610						0.005	0.005	7914249.7	560158.125	188.5	1.5	NAG
2016	QMR2	190	QMR2 1190 024	R766729	1306						0.005	0.005	7914223.99	560144.706	199.094	9.094	NAG
2016	QMR2	190	QMR2 1190 024	R766730	1702						0.005	0.04	7914234.52	560152.797	199.394	9.394	NAG
2016	QMR2	190	QMR2 1190 024	R766731	1705	1	15	8.4	7	1.78	0.01	0.27	7914227.54	560153.76	199.398	9.398	PAG
2016	QMR2	190	QMR2 1190 024	R766732	1709						0.05	0.03	7914216.94	560155.583	199.902	9.902	NAG
2016	QMR2	190	QMR2 1190 024	R766733	1709						0.01	0.02	7914216.94	560155.583	199.902	9.902	NAG
2016	QMR2	190	QMR2 1190 024	R766734	2018						0.005	0.005	7914205.01	560150.77	199.886	9.886	NAG
2016	QMR2	190	QMR2 1190 025	R766967	1915						0.1	0.01	7914143.71	560140.048	201.584	11.584	NAG
2016	QMR2	190	QMR2 1190 025	R766968	2310						0.12	0.01	7914155.17	560151.416	201.822	11.822	NAG
2016	QMR2	190	QMR2 1190 025	R766969	1812						0.12	0.01	7914153.39	560139.577	201.696	11.696	NAG
2016	QMR2	190	QMR2 1190 025	R766970	2217						0.08	0.05	7914138.77	560145.78	201.49	11.49	NAG
2016	QMR2	190	QMR2 1190 025	R766971	2505						0.07	0.12	7914167.87	560158.519	201.035	11.035	NAG
2016	QMR2	190	QMR2 1190 025	R766972	2511						0.21	0.01	7914151.62	560155.366	202.111	12.111	NAG
2016	QMR2	190	QMR2 1190 025	R766973	2108						0.06	0.09	7914160.92	560147.748	201.176	11.176	NAG
2016	QMR2	190	QMR2 1190 025	R766974	1620						0.1	0.01	7914133.3	560131.001	200.347	10.347	NAG

TABLE D.6.2
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
QUARRY D1Q2 GEOCHEMISTRY ANALYTICAL
SAMPLING RESULTS FOR 2016
SUMMARY STATISTICS

	C (%)	S (%)
COUNT	24	24
MIN	0.01	0.01
MAX	0.65	0.05
MEAN	0.104	0.017

TABLE D.6.2.1
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
QUARRY D1Q2 GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED QUARRY ROCK																	
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	CLASS
2016	D1Q2	280	D1Q2 1280 001	1908						0.01	0.005	7913181.59	563347.245	282.311	2.311	NAG
2016	D1Q2	280	D1Q2 1280 001	2406						0.06	0.02	7913193.15	563340.965	284.627	4.627	NAG
2016	D1Q2	280	D1Q2 1280 001	1803						0.01	0.005	7913179.2	563332.914	283.228	3.228	NAG
2016	D1Q2	280	D1Q2 1280 001	1206						0.005	0.01	7913165.52	563340.803	279.659	-0.341	NAG
2016	D1Q2	280	D1Q2 1280 003	2204						0.05	0.03	7913240.7	563400.228	287.786	7.786	NAG
2016	D1Q2	280	D1Q2 1280 003	1703						0.03	0.02	7913229.14	563398.305	286.264	6.264	NAG
2016	D1Q2	280	D1Q2 1280 003	1706						0.19	0.03	7913229.1	563406.159	286.188	6.188	NAG
2016	D1Q2	280	D1Q2 1280 003	2107						0.04	0.04	7913238.44	563409.074	287.649	7.649	NAG
2016	D1Q2	280	D1Q2 1280 003	1811						0.47	0.02	7913231.42	563418.187	286.474	6.474	NAG
2016	D1Q2	280	D1Q2 1280 003	1908						0.03	0.02	7913233.68	563411.624	287.162	7.162	NAG
2016	D1Q2	280	D1Q2 1280 005	1316						0.03	0.01	7913235.32	563376.331	287.075	7.075	NAG
2016	D1Q2	280	D1Q2 1280 005	1214						0.05	0.01	7913230.15	563371.369	286.41	6.41	NAG
2016	D1Q2	280	D1Q2 1280 005	1421						0.06	0.01	7913242.77	563385.587	287.278	7.278	NAG
2016	D1Q2	280	D1Q2 1280 005	1118						0.1	0.01	7913233.6	563383.078	285.91	5.91	NAG
2016	D1Q2	280	D1Q2 1280 006	1819						0.65	0.01	7913231.4	563439.248	285.439	5.439	NAG
2016	D1Q2	280	D1Q2 1280 006	1521						0.03	0.01	7913224.46	563446.078	283.846	3.846	NAG
2016	D1Q2	280	D1Q2 1280 006	2112						0.05	0.01	7913238.17	563422.198	287.13	7.13	NAG
2016	D1Q2	280	D1Q2 1280 006	1915						0.09	0.01	7913233.89	563430.099	286.49	6.49	NAG
2016	D1Q2	280	D1Q2 1280 006	1713						0.01	0.01	7913229.08	563424.757	285.574	5.574	NAG
2016	D1Q2	285	D1Q2 1285 002	1116						0.1	0.05	7913247.33	563378.703	287.262	2.262	NAG
2016	D1Q2	285	D1Q2 1285 002	1109						0.03	0.02	7913238.66	563362.297	286.551	1.551	NAG
2016	D1Q2	285	D1Q2 1285 002	1913						0.29	0.01	7913260.12	563363.329	289.956	4.956	NAG
2016	D1Q2	285	D1Q2 1285 002	1815						0.11	0.02	7913259.63	563367.602	289.746	4.746	NAG
2016	D1Q2	285	D1Q2 1285 002	1012						0.01	0.01	7913239.91	563369.31	286.083	1.083	NAG

Baffinland

TABLE D.6.3

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
QUARRY Q01 GEOCHEMISTRY ANALYTICAL
SAMPLING RESULTS FOR 2016
SUMMARY STATISTICS

	C (%)	S (%)
COUNT	4	4
MIN	0.030	0.010
MAX	0.11	0.01
MEAN	0.053	0.010

TABLE D.6.3.1
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

2016 QIA AND NWB ANNUAL REPORT FOR OPERATIONS
QUARRY Q01 GEOCHEMISTRY ANALYTICAL SAMPLING RESULTS FOR 2016

2016 BLASTED QUARRY ROCK																
YEAR	Location	Bench	Blast ID	Hole ID	Fizz Rating	NP (tCaCO3/1Kt)	MPA (tCaCO3/1Kt)	NNP (tCaCO3/1Kt)	Ratio (NP:MPA)	C (%)	S (%)	y	x	z	DEPTH	CLASS
2016	Q01	53	Q01 1054 017	811						0.04	0.01	7975215	503987.7	60.276	7.276	NAG
2016	Q01	53	Q01 1054 017	708						0.03	0.01	7975213	503995.4	60.61	7.61	NAG
2016	Q01	53	Q01 1054 017	617						0.03	0.01	7975228	503974.5	60.185	7.185	NAG
2016	Q01	53	Q01 1054 017	713						0.11	0.01	7975221	503982.5	60.485	7.485	NAG

APPENDIX D.7

INSPECTION REPORTS AND FOLLOW-UP REPORTS

APPENDIX D.7.1

FISHERIES ACT DIRECTION (FAD) - ECCC

DIRECTION

FISHERIES ACT
Subsection 38(7.1)

File: 4408-2016-05-10-001

PROTECTED B
ENFORCEMENT

June 7, 2016

Registered with acknowledgement of receipt

Baffinland Iron Mines Corporation
c/o

Brian Penney
Chief Executive Officer
Baffinland Iron Mines Corporation Mary River Project
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Sylvain Proulx
Chief Operations Officer
Baffinland Iron Mines Corporation Mary River Project
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Todd Burlingame
Vice-President, Sustainable Development
Baffinland Iron Mines Corporation Mary River Project
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

James Millard
Environmental Manager
Baffinland Iron Mines Corporation Mary River Project
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

RE: *FISHERIES ACT* DIRECTION

This document constitutes a direction to the persons named above, pursuant to subsection 38(7.1) of the *Fisheries Act* as amended, hereinafter referred to as the *Fisheries Act*.

This direction confirms in writing the verbal direction given to Baffinland Iron Mines Corporation (BIM), c/o **Mr. James Millard, Mr. Sylvain Proulx**, and **Mr. Bernard Laflamme**, on **May 20, 2016.**

In addition, the following recipients of this written direction was not provided with a verbal direction, but have been added to this written direction:

Brian Penney
Chief Executive Officer

Todd Burlingame
Vice-President, Sustainable Development

REASONABLE GROUNDS FOR BELIEF

I, Curtis Didham, an Inspector designated by the Minister of Fisheries and Oceans under subsection 38(1) of the *Fisheries Act*, have reasonable grounds to believe:

1. That there occurs a deposit of a deleterious substance in water frequented by fish that is not authorized under the *Fisheries Act* and there is a serious and imminent danger of a deposit of a deleterious substance in water frequented by fish.

2. That detriment to fish habitat or fish or to the use by humans of fish results or may reasonably be expected to result from the occurrence and that immediate action is necessary in order to take all reasonable measures consistent with the public safety and with the conservation and protection of fish and fish habitat to prevent the occurrence or to counteract, mitigate or remedy any adverse effects that result from the occurrence or might reasonably be expected to result from it.

3. That all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat have not been taken as required by subsection 38(6) of the *Fisheries Act*.

4. That I observed that and/or was informed that:

    a. The BIM, Mary River Project is a high-grade iron ore mine operation located in the Qikiqtani Region of northern Baffin Island, Nunavut.

    b. The Mary River Project is owned and operated by BIM.

    c. To allow use of water and to deposit waste to water activity the BIM, Mary River Project was issued a Nunavut Water Board Water type A Licence 2AM-MRY1325 pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* in which Indigenous and Northern Affairs Canada (INAC) enforces.

    d. The BIM, Mary River Project was issued a No. 005 Project Certificate (NIRB File No 08MN053) by the Nunavut Impact Review Board pursuant to the *Nunavut Land Claims Agreement*.

e. On May 10, 2016 EO DIDHAM received an email from James Millard stating that on Saturday evening, May 7, 2016, a snowmelt event occurred at the Mary River Mine Site which caused runoff containing some discoloured water / sediment to flow to Sheardown Lake.

f. On May 10, 2016 EO DIDHAM received a NT/NU Spill Report 2016-158 from Enforcement Officer (EO) MURISON (Northern District Spills Duty Officer) which was submitted by Allan Knight (Baffinland Environmental Superintendent) stating that on Saturday evening, May 7, 2016, a snowmelt event occurred at the Mary River Mine Site which caused runoff containing some discoloured water / sediment to flow to Sheardown Lake.

g. On May 11, 2016 a teleconference meeting was held between ECCC, INAC, and BIM to discuss the NT/NU Spill Report 2016-158. During this meeting BIM committed to providing sampling results from chemistry and bioassay samples collected on May 10, 2016

h. On May 17, 2016 EO DIDHAM receives Preliminary Lab chemistry sampling results analysis from Allan Knight of Sheardown Lake Surface Water Runoff samples (pH, TSS, TDS Turbidity) TSS level readings of 54.8, 26.5, 21.5, 18.8,47.6,32.8,70,61.2,118,101,90.5,18.8,21.6,12,69.6,29.6,82 ect..... On May 27, 2016 Anne Wilson (Environment Canada Water Pollution Specialist) reviewed the preliminary Lab Analysis results and stated to EO DIDHAM in an email that "the measured TSS and turbidity are well above CCME guidelines for increases in total suspended solids and turbidity, but would not be in the acute effects range. We would expect to see issues with sediment coating the substrate, and impaired primary and secondary productivity, as well as sublethal effects on fish. It was evident from the variation in TSS-turbidity levels between sites that there are different sizes of particles for the different sampling sites, and accordingly we would expect different settling behaviors and effects on gills."

i. On May 17, 2016 EO DIDHAM received a NT/NU Spill Report 2016-176 from EO MACDONALD (Northern District spills Duty Officer) which was submitted by Allan Knight (BIM Environmental Superintendent) stating that on Tuesday, May 17, 2016 runoff containing sediments was observed to be flowing into Camp Lake Tributary # 1 and into Camp Lake.

5. On May 18 & 19, 2016 EO DIDHAM conducted a joint on-site inspection with Indigenous and Northern Affairs Canada (INAC) Water Resource Officers Justin Hack and Jonathan Mesher and INAC Environmental Assessment Jason Patchell at the BIM, Mary River Project and observed:

   a. The shoreline and above the high tide mark North West of the Milne Port iron ore stockpile and West of the Milne Port Stockpile West Sedimentation Pond (MP-06) at the Milne Port Inlet site observed snow with dust sedimentation 30 – 50 meters away from Milne Inlet, Arctic Ocean.

   b. The Milne Port Stockpile East Sedimentation Pond (MP05) located North East of the Iron Ore stockpiles was not fully constructed which was designed and being constructed to allow contact water from the iron ore stockpiles to divert into the Milne Port Stockpile East Sedimentation Pond (MP05) to prevent the contact water with the iron ore stockpiles from entering Milne Inlet, Arctic Ocean.

   c. The Milne Port Stockpile West Sedimentation Pond (MP06) located North West of the iron ore stockpiles had some ditching to allow contact water from the iron ore stockpiles to divert into the Milne Port Stockpile West Sedimentation Pond (MP06) to prevent the contact water from entering Milne Inlet, Arctic Ocean.

   d. Red rusty coloured water was observed in many culverts and bridges along the Tote Road from the Milne Port Site to the Mary River Mine Site flowing into David Lake, Mural Lake, Kabikok Lake, KM 32 Lake, KM 27 Lake, Camp Lake, Sheardown Lake, Mary River, and Phillips Creek.

e. In some areas of the Mary River Project, silt screens, silt fencing, flocculent blocks and flocculent netting in streams and culvert ditches and also check dams in streams had been installed.

f. One water pump pumping red rusty coloured water from a tributary flowing into Sheardown Lake into a constructed Mary Rive Mine Site Iron Ore Stockpile crusher sediment pond (MS06) adjacent to the iron ore stockpiles.

g. Along the Tote Road from Mary River Mine Site to the Milne Inlet Port Site there was no or very little installed 6 inch rip rap rock in the ditching to divert water from coming into contact with the Tote Road to prevent road washout and erosion.

h. Along the Tote Road from Mary River Mine Site to the Milne Inlet Port Site under all 4 bridge crossings was displaced road sediment from vehicle traffic on the surface of the ice.

i. Along the Mary River Mine Hall Tote Road leading from Mary River Camp to Deposit # 1 for 4 kilometres there was recently installed 6 inch rip rap rock in the ditching and newly installed culverts to divert water from coming into contact with the Mine Hall Tote Road preventing road washout and erosion.

6. During a face to face meeting between INAC, ECCC, and BIM held on May 19, 2016 EO DIDHAM was informed that BIM will be taking immediate actions to remove the snow impacted by dust sediment located along the shoreline and above the high tide mark North West of the Iron Ore stockpile and West of the Milne Port Stockpile West Sedimentation Pond (MP-06) at the Milne Port Site.

7. On May 19, 2016 a face to face meeting between INAC, ECCC, and BIM was held. The following was discussed:

   a. The main source of sediment runoff from the Tote Road and Mary River Mine Hall Tote Road is caused by snow that has become imbedded in the road over the winter from vehicle traffic and grading operations. In the spring as the road warms the snow imbedded in the road melts causing the water to carry the sediment off the road into culverts, ditches, and streams which leads to David Lake, Murial Lake, Kabiktok Lake, KM 32 Lake, KM 27 Lake, Camp Lake, Sheardown Lake, Mary River, and Phillips Creek.

   b. The main source of sediment surface water runoff from the tundra is caused by crushing operations, wind coming in contact with the crushed rock/iron ore stockpiles, and vehicle traffic on the Tote Road and Mary River Mine Hall Road. When the snow melts on the tundra or it rains on the tundra the water carries the settled accumulated dust sediment into David Lake, Murial Lake, Kabiktok Lake, KM 32 Lake, KM 27 Lake, Camp Lake, Sheardown Lake, Mary River, and Phillips Creek.

   c. The main source of road sediment located on top of the ice creeks/streams under all bridge crossings along the Tote Road from Milne Port to the Mary River Mine Site is caused by vehicle traffic going over the bridge by displacing the road sediment off the bridge to the surface of the ice.

8. On May 19, 2016 EO DIDHAM and INAC Water Resource Officers Justin Hack and Jonathan Mesher and Jason Patchell (INAC Environmental Assessment), and Baffinland's Connor Devereaux conducted sampling at 3 locations. Location one - Landfill Trib, Location two - Camp Lake Water Intake area near Sheardown Lake, and location 3 - Sheardown Lake Trib. Chemistry

samples (TSS, Total Metals, pH, and Radium) and two 20 litre pail samples were collected for a multi-concentration Bioassay analysis at all 3 locations.

9. On May 20, 2016 at 07:46hrs EO DIDHAM issued a verbal *Fisheries Act* Direction (FAD) to BIM, Mary River Project. In attendance were EO DIDHAM, Justin Hack, Jonathan Mesher, Jason Patchell, James Millard (Environmental Manager), Sylvain Proulx (Incoming Chief Operations Officer), and Bernard Laflamme (Outgoing Chief Operations Officer).

10. On May 21, 2016 EO DIDHAM (Northern District Spills Duty Officer) received a NT/NU Spill Report 2016-181 which was submitted by James Millard (BIM Environmental Manager) stating that on May 20, 2016 surface water runoff containing sediment was observed to be flowing from the surface of the Mine Haul Road through several breaks (punch outs) on the outer edge of the road and there was a risk to Mary River and Sheardown tributary and lake.

11. On May 21, 2016 EO DIDHAM shipped chemistry samples and multi-concentration Bioassay samples to the ECCC Lab in Edmonton from Iqaluit for analysis.

12. On May 24, 2016 EO DIDHAM receives Milne Port stockpile action plan from James Millard.

13. On May 27, 2016 EO DIDHAM receives an email from Georgina Williston (Fisheries & Oceans Canada, Senior Fisheries Protection Biologist) stating that David Lake, Murial Lake, Kabiktok Lake, KM 32 Lake, KM 27 Lake, Camp Lake, Sheardown Lake, Mary River, and Phillips Creek are all fish bearing waters or connected to fish bearing waters and most of the larger and medium sized streams with culverts and bridges belonging to those aforementioned waterbodies are also fish bearing waters and provide seasonal fish habitat, since the juvenile char and in some cases stickleback use this habitat in the open water season for feeding and rearing habitat. This confirmed the information that EO DIDHAM was aware of prior to issuing the verbal Inspectors direction.

14. On May 31, 2016 ECCC issues BIM Notice of Intent (NOI) and draft FAD c/o **Mr. James Millard, Mr. Sylvain Proulx**, and **Mr. Bernard Laflamme.**

15. On May 31, 2016 EO DIDHAM receives an email response letter regarding the issued NOI and draft FAD from Todd Burlingame (BIM, Vice-President, Sustainable Development).

16. On May 31, 2016 EO DIDHAM receives an email from James Millard stating that on May 29, 2016 a deposit of sediments was observed near Camp Lake Tributary #1. The source of the sediment was from a stream bank failure along a limited area. It is suspected that the embankment failure may have been caused by water draining from the airstrip. The event resulted in sand deposit that partially encroached on the stream.

17. On June 1, 2016 EO DIDHAM receives spill Report 2016-198 from EO MONTEITH (spills Line Duty Officer (May 31 to June 7, 2016). The spill report states that on May 29, 2016 a deposit of sediments was observed near Camp Lake Tributary #1. The source of the sediment was from a stream bank failure along a limited area. It is suspected that the embankment failure may have been caused by water draining from the airstrip. The event resulted in sand deposit that partially encroached on the stream.

18. On June 1, 2016 EO DIDHAM receives Preliminary multi-concentration Bioassay sampling results from the ECCC Prairie and Northern lab for all 3 sampling locations. All sampling location results for the multi-concentration Bioassay analysis was determined to be **not acutely lethal.**

19. On June 2, 2016 EO DIDHAM receives email from James Millard stating that during an environmental inspection of the Milne Tote Road on May 31, three locations were observed where there was turbid water and sediment present in culvert outlet locations. These locations were

stream crossings CV-223 at km 97, BG-17 at km 90, and BG-29 at km 85. The source of the sediment is erosion from spring freshet.

20. On June 2, 2016 EO DIDHAM receives spill Report 2016-202 from EO MONTEITH (spills Line Duty Officer (May 31 to June 7, 2016). The spill report states that during an environmental inspection of the Milne Tote Road on May 31, three locations were observed where there was turbid water and sediment present in culvert outlet locations. These locations were stream crossings CV-223 at km 97, BG-17 at km 90, and BG-29 at km 85. The source of the sediment is erosion from spring freshet.

21. On June 3, 2016 a teleconference oral representations meeting was held between ECCC and BIM to discuss and review the draft FAD. The purpose of this oral representations meeting was to give BIM an opportunity to be heard to clear up any factual errors in the draft FAD. During this meeting ECCC was informed that:

    a. On May 23, 2016 BIM commenced clean-up of the dust sediment impacted snow located at Milne Inlet Port shoreline and above the high tide mark North West of the iron ore stockpiles and West of the West Iron Ore Stockpile Sedimentation Pond (MP-01a) to prevent the snow impacted dust sediment from entering Milne Inlet, Arctic Ocean. Continued monitoring and additional cleanup remain ongoing.
    a. On May 23, 2016 BIM commenced clean-up of road sediments located on top of the ice creeks/streams under all 4 bridges crossings along the Tote Road from the Milne Port Site to the Mary River Mine Site to prevent it from entering the creeks/streams. Continued monitoring and cleanup remain ongoing.
    b. On May 22, 2016 mobilized and commenced construction of drainable ditching system at Milne Port Ore Stockpile. Anticipated completion on or before July 17, 2016.
    c. During the week of May 22, 2016 surface water control measures (construction of check dams, capping sections of mine haul road) commenced and remain ongoing.
    d. BIM has commenced work on preparation of plans to address the aforementioned matters, for submission to ECCC and INAC.

22. On June 3, 2016 EO DIDHAM receives email with attachment from Todd Burlingame. The attachment provided supporting written documentation for oral representations from BIM to ECCC. The attachment requested edits to draft FAD which was reviewed earlier that same day during the teleconference oral representations meeting between ECCC and BIM.

MEASURES TO BE TAKEN

Under the authority given to me pursuant to subsection 38(7.1) of the *Fisheries Act*, I hereby direct the persons named above to immediately take all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat to prevent the above mentioned occurrence or to counteract, mitigate, or remedy, any adverse effects that result from the above mentioned occurrence or might reasonably be expected to result from it, including:

1. Provide by **June 24, 2016**, a report on the actions taken to address sedimentation issues at the BIM, Mary River Project following the ECCC on-site inspection of May 18-20, 2016 and provide Bi-weekly updates (once every two weeks) of ongoing actions being taken at the site including actions to address issues mentioned in measures to be taken 2 & 3.

2. Provide by **September 30, 2016** a dust mitigation action plan with an implementation schedule addressing crushing operations, wind coming in contact with the crushed rock/iron stock piles, and vehicle traffic on the Tote Road.

3. Provide by **September 30, 2016** a Tote Road and Mine Hall Road mitigation action plan with an implementation schedule addressing sediment water runoff from the road into culverts, ditches, and creeks/streams which leads to David Lake, Mural Lake, Kabikok Lake, KM 32 Lake and KM 27 Lake, Camp Lake, Sheardown Lake, Mary River, and Phillips Creek.

4. Finish constructing by **July 17, 2016** the drainage ditching to the Milne Port Stockpile East Sedimentation Pond (MP05) to allow contact water with the iron ore stockpiles to divert into the Milne Port Stockpile East Sedimentation Pond (MP05) to prevent the contact water from entering Milne Inlet, Arctic Ocean.

5. Finish constructing by **July 17, 2016** the drainage ditching to the Mary Rive Mine Site Iron Ore Stockpile crusher sediment pond (MS06) to allow contact water with the iron ore stockpiles and crusher area to divert into this Sedimentation Pond (MS06) to prevent the contact water from entering Sheardown Lake.

A report on the completion of these measures signed by **Mr Brian Penney** must be submitted in writing to the undersigned Inspector on or before **September 30, 2016.**

Failure to comply with the whole or any part of a Direction is an offence under paragraph 40(3)(g) of the *Fisheries Act*. This Direction is without prejudice to any further action Environment Canada may take with respect to any violation of the *Fisheries Act* including an amended direction or prosecution

THE LAW

Fisheries Act

Deposit of deleterious substance prohibited

36(3) Subject to subsection (4), no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

Duty to notify – deleterious substance

38(5) If there occurs a deposit of a deleterious substance in water frequented by fish that is not authorized under this Act, or if there is a serious and imminent danger of such an occurrence, and detriment to fish habitat or fish or to the use by humans of fish results or may reasonably be expected to result from the occurrence, then every person shall without delay notify an inspector, a fishery officer or an authority prescribed by the regulations if the person at any material time

(a) owns or has the charge, management or control of
(i) the deleterious substance, or
(ii) the work, undertaking or activity that resulted in the deposit or the danger of the deposit; or
(b) causes or contributes to the occurrence or the danger of the occurrence.

Duty to take corrective measures

38(6) Any person described in paragraph (4)*(a)* or *(b)* or 5(a) or (b) shall, as soon as feasible, take all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat to prevent the occurrence or to counteract, mitigate or remedy any adverse effects that result from the occurrence or might reasonably be expected to result from it.

Report

38(7) As soon as feasible after the occurrence or after learning of the danger of the occurrence, the person shall provide an inspector, fishery officer or an authority prescribed by the regulations with a written report on the occurrence or danger of the occurrence.

Corrective measures

38(7.1) If an inspector or fishery officer, whether or not they have been notified under subsection (4) or (5) or provided with a report under subsection (7), is satisfied on reasonable grounds that immediate action is necessary in order to take any measures referred to in subsection (6), the inspector or officer may, subject to subsection (7.2), take any of those measures at the expense of any person described in paragraph (4)(a) or (b) or (5)(a) or (b) or direct such person to take them at that person's expense.

40(2) Every person who contravenes subsection 36(1) or (3) is guilty of an offence and liable

(a) on conviction on indictment,

(i) in the case of an individual,
(A) for a first offence, to a fine of not less than $15,000 and not more than $1,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $30,000 and not more than $2,000,000, or to imprisonment for a term not exceeding three years, or to both,

(ii) in the case of a person, other than an individual or a corporation referred to in subparagraph (iii),
(A) for a first offence, to a fine of not less than $500,000 and not more than $6,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $1,000,000 and not more than $12,000,000, and

(iii) in the case of a corporation that the court has determined to be a small revenue corporation,
(A) for a first offence, to a fine of not less than $75,000 and not more than $4,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $150,000 and not more than $8,000,000; or

(b) on summary conviction,

(i) in the case of an individual,
(A) for a first offence, to a fine of not less than $5,000 and not more than $300,000, and
(B) for a second or subsequent offence, to a fine of not less than $10,000 and not more than $600,000, or to imprisonment for a term not exceeding six months, or to both,

(ii) in the case of a person, other than an individual or a corporation referred to in subparagraph (iii),
(A) for a first offence, to a fine of not less than $100,000 and not more than $4,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $200,000 and not more than $8,000,000, and

(iii) in the case of a corporation that the court has determined to be a small revenue corporation,
(A) for a first offence, to a fine of not less than $25,000 and not more than $2,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $50,000 and not more than $4,000,000.

Other offences

40(3) (*e*)fails to take any reasonable measures that he or she is required to take under subsection 38(6) or fails to take those measures in the required manner, or

(*f*)fails to provide a report that he or she is required to provide under subsection 38(7), or (*g*)fails to comply with the whole or any part of a direction of an inspector or a fishery officer under subsection 38(7.1).

40(3) Every person who

is guilty of an offence punishable on summary conviction and liable, for a first offence, to a fine not exceeding two hundred thousand dollars and, for any subsequent offence, to a fine not exceeding two hundred thousand dollars or to imprisonment for a term not exceeding six months, or to both.

Power to recover costs

42(2) All the costs and expenses referred to in subsection (1) are recoverable by Her Majesty in right of Canada or a province with costs in proceedings brought or taken therefor in the name of Her Majesty in any such right in any court of competent jurisdiction.

Continuing offences

78.1 Where any contravention of this Act or the regulations is committed or continued on more than one day, it constitutes a separate offence for each day on which the contravention is committed or continued.

78.2 Where a corporation commits an offence under this Act, any officer, director or agent of the corporation who directed, authorized, assented to, acquiesced in or participated in the commission of the offence is a party to and guilty of the offence and is liable on conviction to the punishment provided for the offence, whether or not the corporation has been prosecuted.

CONCLUSION

This direction is without prejudice to any further course of action that Environment and Climate Change Canada may take with respect to any violation of the *Fisheries Act*, including an amended Direction, prosecution, or the seeking of an injunction from the court under the *Fisheries Act*, or any other Act.

This direction and the circumstances to which it refers will form part of Environment and Climate Change Canada's records of Baffinland Iron Mines Corporation and its responsible officials, and will be taken into account in future responses to alleged violations and for internal purposes such as setting the frequency of inspections. Environment Canada will consider taking further action if you do not take all necessary corrective steps to comply.

This direction is issued in accordance with the Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act*. The complete text of this policy is available on Environment Canada's website:
http://www.ec.gc.ca/alef-ewe/default.asp?lang=En&n=D6B74D58-1

The complete text of the *Fisheries Act* available on the Department of Justice website : http://laws-lois.justice.gc.ca/Search/

For more information or to respond to the alleged facts contained in this direction, please call or write the undersigned. Your comments will be considered, and where appropriate, a response provided. Any comments you make, as well as Environment Canada's response, will be maintained on file with this direction in Environment Canada's records.

Curtis Didham
Inspector
Environmental Enforcement Directorate
Enforcement Branch
Environment Canada
Iqaluit, Nunavut
Suite 301, 3rd Floor, Qilaut Building
933 Mivvik Street
P.O. Box 1870 X0A 0H0

APPENDIX D.7.2

LETTER OF NON-COMPLIANCE (LNC) – INAC

Indigenous and Northern Affairs Canada / Affaires autochtones et du Nord Canada

Letter of Non-Compliance

June 16, 2016

Sylvain Proulx
Chief Operations Officer
Baffinland Iron Mines Corporation Mary River Project
2278 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

RE: Letter of Non-Compliance issued to Baffinland Iron Mine's Corporation for non-compliance with Part D Item 4 of Nunavut Water Board Licence 2AM-MRY1325

Background

In June 2015, during a routine Water Licence Inspection at Baffinland Iron Mines Corporation's Mary River Project, it was identified that proper diversion ditches were not installed around the Ore Stockpile Pad at Milne Inlet to divert water into the Ore Stockpile Sedimentation Ponds. These ditches were identified as a priority to prevent sediment water from directly entering the environment. In a follow-up report, BIMC committed to commissioning the ditching system related to this infrastructure prior to freshet 2016.

Furthermore, in August 2015, during a routine Water Licence Inspection, it was identified that there are sections along the Tote Road that require preventative measures to deal with sedimentation because soil conditions along the road are prone to sloughing, excessive wetness and silt loading. In a follow-up report, BIMC has committed to using armour stone in ditches that receive high levels of flow prior to freshet 2016.

During the recent May 2016 Water Licence Inspection, the Ore Stockpile Pad Diversion Ditches and the areas prone to sedimentation along the Tote Road were inspected. It was noted that BIMC has not met the deadline they committed to in June 2015 to complete the diversion ditches leading to the sedimentation ponds at the Ore Stockpile area prior to Freshet 2016; and, that BIMC did not implement significant sedimentation prevention measures along the Tote Road to prevent sediment from entering water.

Justification for why these commitments were not completed was only communicated to the Inspector after the deadline was passed.

Determination

This letter is being issued to BIMC because their commitments to address the sites of concern as identified in previous inspections have not been achieved prior to their deadlines.

It should be noted that since the Inspection in May 2016, BIMC has produced a plan to address the Ore Stockpile Diversion Ditches at Milne Inlet with a completion date by July 17, 2016. This plan was submitted to INAC on May 23, 2016 and this is considered a reasonable approach to address this situation.

BIMC has also committed to producing an Action Plan to address the sedimentation of watercourses along the Tote Road. This plan shall be submitted to the INAC Inspector by June 24, 2016 and will include a schedule of work to be done in 2016 on the Tote Road to specifically deal with the sedimentation of watercourses.

This letter also serves as a warning that further enforcement measures may be taken if reasonable diligence towards meeting the requirement of their licence, Part D Item 4, are not addressed, namely *"The Licensee shall implement sediment and erosion control measures, as required, prior to ensuring all phases of the Mary River Project to prevent and/or minimize sediment loading into water."*

Should you have any questions please contact me at (867) 975-4517.

Justin Hack, BSc, MREM
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Indigenous and Northern Affairs Canada
Nunavut Regional Office
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cc. Nunavut Water Board
Erik Allain, Manager Field Operations, INAC
Jim Millard, BIMC
Sarah Forte, INAC

APPENDIX D.7.3

FAD-LNC BIWEEKLY REPORTS AND COMPLETION REPORT

INITIAL BAFFINLAND RESPONSE REPORT (ABBREVIATED)

Report on Actions Taken:

June 7th 2016, Fisheries Act Direction (File number: 4408-2016-05-10-001) and

Response to June 16, 2016, INAC Letter of Non-Compliance

Report No. 1

June 24, 2016

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Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.
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Spill Report 16-202 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
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- D.6 - Milne and Mine Site Drainage Works
- D.7 - Removal of Impacted Snow: Milne Beach and Tote Road Bridges

1. Preventative Measures Undertaken Prior to Freshet and May 2016 Regulatory Inspections

1.1. Mine Haul Road

A major program of culvert replacement and riprap installation was completed on the Mine Haul Road between km 105 and km 110 between April 15 and May 15, 2016. The work involved the installation of 525 linear metres of new culverts, and the installation of 4,400 m3 of rip rap in 3.5 km of ditches and on surface slopes located upstream and downstream of seven culvert crossings. The completed work reduces the potential for Mine Haul Road wash out and is designed to effectively and safely convey water from upstream to downstream locations along the Mine Haul Road. A drawing showing the design of the new drainage works as well as series of photos showing culvert installations and riprap installation are presented in Appendix A.1. The work was completed under the guidance of a Professional Engineer, retained by Baffinland, from Golder Associates, and the constructed drainage works are being monitored for operational performance during freshet. Deficiencies identified, if any, during this monitoring will be corrected later in the summer based on recommendations provided by from Golder Associates.

1.2. Other measures

Other measures completed prior to freshet and the May 2016 inspection included a comprehensive program of freshet preparation that included the following components:

- Periodic freshet preparation meetings were held at the Mine Site, coordinated by the Environment Department, from early February until the start of freshet in mid-May. The meetings were held bi-weekly from the April to May period as freshet neared. The meetings were attended by key site managers and superintendents. The meetings were well documented and action items were routinely distributed to all participants for advancement.
- Development of list of high priority stream crossings along the Tote Road that required early snow excavation and culvert clearing. The stream crossings were prioritized based on fisheries considerations and flows (high or low flow).
- The procurement of adequate supply of equipment and supplies to support freshet preparation and response activities. These included the purchase of adequate quantity and types of pumps, hoses, steam jetties, silt fences, silt curtains, and flocculent products.
- The assignment of adequate resources at site for the freshet preparation and management effort including production of rip rap using production crushers, haul trucks, excavators, loaders, and steamers.
- The procurement and assignment of contracted labour for the purpose of culvert clearing and snow removal activities.
- An early start to freshet preparation field activities was initiated during 2016 with the start of field activities in mid-April, well in advance of the start of freshet as follows:
  - Monitoring of any runoff from the ore stockpile perimeters to ensure no discharge to the receiving environment. None has been observed.
  - Clearing of snow from the road surface, embankment, and from areas adjacent to the road to minimize the impact of runoff from road contact water to downstream water bodies.
  - Early excavation and clearing of snow from the inlets and outlets of the stream crossings. Clearing of culverts with steamers as required to ensure.
- The installation of silt fences, flocculent blocks, flocculent netting, and check dams at selected locations.

Frozen and hard packed ground conditions contributed to difficulties in the construction of a drainage system around the perimeter of the Milne Port Ore Stockpile and the Crusher Stockpile areas. Attempts were made but these locations were extremely difficult to excavate during the winter season due to the frozen ground conditions that made penetration with standard excavator near- impossible using standard methods. The project at Milne Port was delayed until the later in May when ground thaw permitted excavation through the developing active layer.

After freshet is over, the results of the 2016 freshet preparation plan will be reviewed and a list of lessons learned will be compiled and corrective actions implemented prior to freshet in 2017.

During 2015, Baffinland retained the services of a flocculent expert, who visited site during August 2015. Based on recommendations made, a quantity of in stream flocculent and other products were purchased for deployment in the event of sediment releases to water bodies.

A monthly fugitive dust monitoring and analytical program was undertaken throughout the year, including the winter season, to track the levels of dust that are deposited at various distances from mining operations. These measurements are an objective means of understanding the levels of dust that are generated from source, transported across site that can become entrained in snow deposits. The dust that becomes entrained in snow can potentially be transported during freshet and this can potentially affect adjacent lakes and streams. The dust monitoring program provides the means to measure changes in potential dust deposition in snow pack.

An Aquatic Effects Monitoring Program and Metal Mining Effluent Regulations Monitoring Program are conducted annually to identify potential changes to water quality, benthos, and fish in downstream water bodies near the Mine Site. The results of the programs during 2016 will identify whether there are any changes to water quality that can be attributed to the specific sediment releases that were reported during the 2016 freshet.

2. Unauthorized Releases and Contributing Factors

A number of unauthorized releases of sediment were reported to Environment Canada, Indigenous and Northern Affairs Canada, and the NT-NU Spill Line during the month of May and June. These included the Spill Report numbers 16-158, 16-176, 16-181, 16-198, 116-202, and 116-202 Update No. 1. A copy of the original Spill Reports are provided in Appendix B. The spill response to these events were resourced substantially at the highest levels within Baffinland management with direct support/involvement from the VP of Sustainability, COO, and CEO.

The major contributing factor to these unanticipated releases included the excessive snowfall, snow pack, and wind events that were observed during 2016. Based on visual observations and anecdotal evidence, the snow pack was much thicker and extensive in 2016 as compared to other years. In addition there were many major wind events during 2016, probably exceeding the number of events that have occurred in recent years' past. The available precipitation and wind data from weather stations will be reviewed for 2016 and compared to previous years to substantiate the visual and anecdotal evidence and included in the Completion Report due September 30, 2016. The thickness and frequency of snow drifting around the project site including the Tote Road, Mine Haul Road, and camp pad areas were extreme and required frequent snow clearing, pushing, and grading activities. This resulted in the removal of surface road materials that became entrained in snow piles adjacent and near the road which were released during the freshet melt. Despite diligent efforts in snow removal and transport, the snow melt that contained road and pad materials melted and were transported to nearby water bodies. The excessive snow pack near the road required the deepening and widening of some of the ditches along the road alignment in order to maintain a transportation link between the two camps for the purpose of safety and transport of provisions. With the commencement of freshet, some of these ditches contributed to limited sediment deposition into nearby water bodies.

A brief warm period in early May resulted in an early onset to freshet that resulted in the unauthorized release reported as 16-158. The quantification of an actual start date of Freshet in a given year can be problematic, as it is often a prolonged event with numerous starts and stalls, dependent on variability of sustained air temperatures. This year there was a brief warm period during the first week of May, followed by fluctuating periods of freeze and thaw. As of the date of this report, freshet is still ongoing with snow pack still being released from the higher elevation areas.

3. Retention of Third Party Expertise

When sediment release events were first observed and reported, third party expertise was retained and these individuals were brought to site. The following expertise was retained:

- Golder Associates - A Senior Geotechnical Engineer was brought to site in late May to study the sedimentation issue with emphasis on best practice for drainage works along the Tote Road, as well as looking at drainage generally across the site. Based on input obtained, a list of action items and areas along the Tote Road was identified and prioritized for action by Baffinland's construction teams. This list of priority areas is provided as Table D.4.2 (Appendix D).
- OPC North – A Construction Manager was retained in late May to lead the actions identified and prioritized along the Tote Road.
- AMEC – A process engineering team was retained to study the effectiveness of various polymers in treating sediment laden waters that were observed along the Mine Haul Road. An intermediate level water treatment professional was brought to site in late May to study the problem and make field and polymer recommendations.
- Kemira Chemical – Samples were sent to Kemira for polymer testing in an effort to continue to identify best potential product to use to settle sediment from the water column. Selected chemical was transported to site to be used in a pilot study. A senior Kemira water quality specialist was brought to site in mid-June to conduct bench and pilot scale field testing on select polymer products for select areas along the Mine Haul Road.
- Le Group Desfor – Road maintenance experts were brought to site in mid-June to provide advice in regard to road maintenance issues.

The input provided will be utilized to develop more detailed action plans related to the Tote Road, Mine Haul Road, and general camp drainage.

4. Water Quality and Acute Toxicity Sampling Results for Areas of Concern

Spill Reports for sediment releases are provided in Appendix B. Potential receivers for the sediment releases include Sheardown Lake, Sheardown Lake Tributary, Camp Lake, Camp Lake Tributaries, Mary River and Mary River Tributaries, David Lake and David Lake Tributaries, Muriel Lake and Muriel Lake Tributaries.

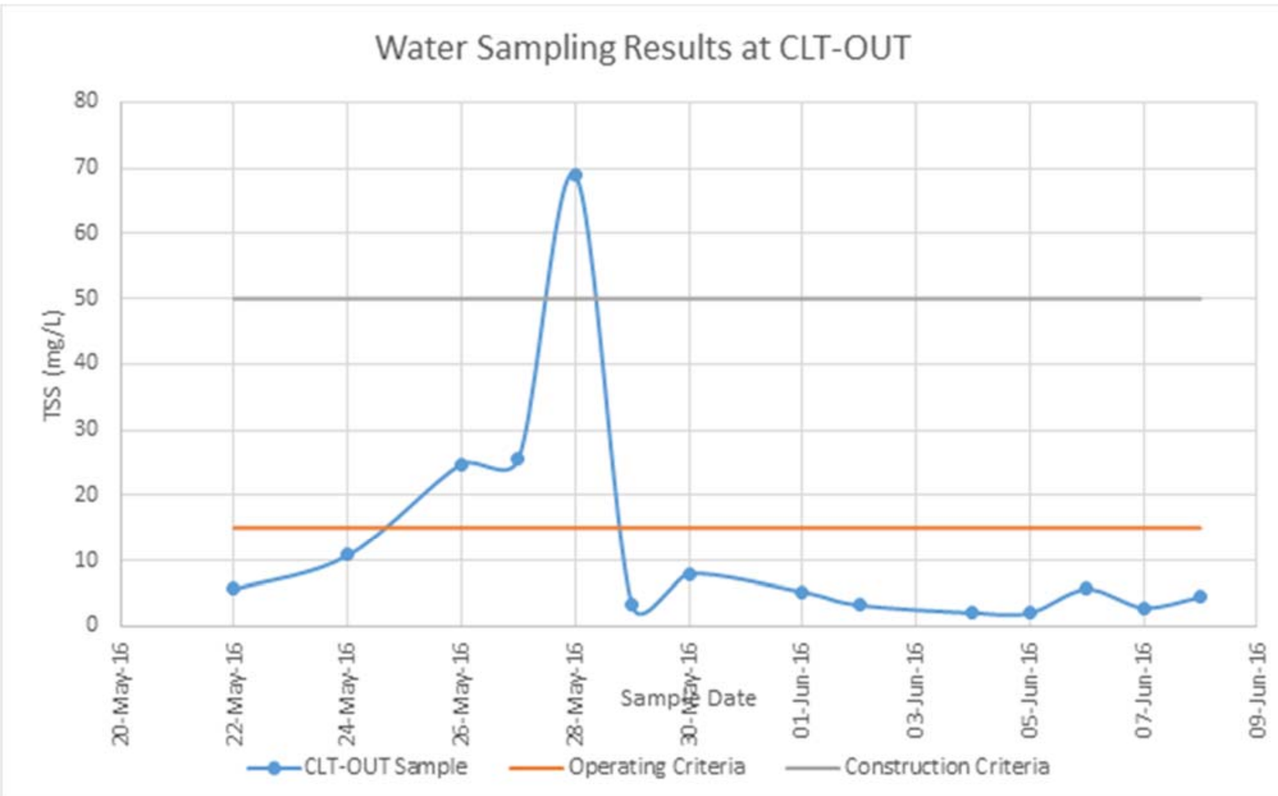
Available water quality and acute toxicity results for Sheardown Lake, Camp Lake, and Mary River systems are provided in Appendix C. GPS coordinates and maps are provided to show approximate sample locations as well as the location of structures that were installed to mitigate the sediment concerns. Water quality data has been compared to the Effluent Quality Discharge Limits for Contact Water (Table 11) provided in the Type "A" Water Licence No. 2AM-MRY1325 for the Mary River Project, which are summarized in the table below:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids	15	30
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Note that in areas where there is or has been active construction, the following effluent discharge limits apply:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids	50	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

During the early stages of freshet, there were a number of instances where water samples exceeded the Discharge Criteria for Total Suspended Solids (TSS) but as the incident response measures were implemented, the majority of the discharge samples taken have met the discharge criteria. As an example, the graph below shows the TSS levels from samples at the Camp Lake Tributary #1 sampling point (CLT-OUT) where the levels of TSS were elevated for several sampling events and then decreased to below the Discharge Criteria as mitigation measures were implemented. A similar trend was observed for the other stream outflows sampled.



In addition, all samples collected for Acute Toxicity analysis have shown non-lethal results from the discharge water.

Water sampling will continue on a regular basis, where it is safe to collect samples, and additional data will be included in the bi-weekly update reports.

5. Corrective Measures for Reported Spills and Other Concerns

5.1. Immediate actions undertaken to address issues

A number of immediate actions were undertaken to address sediment releases to water bodies that were documented in the Spill Reports submitted to authorities. These actions were completed in accordance with the current Surface Water and Aquatic Systems Management Plan (dated March 2016) and are more fully detailed in Appendix D. In summary, the immediate actions undertaken included the following:

- Silt fence installation.
- Silt curtain installation.
- Flocculent installation and addition to the water flow.
- Check dam construction and operation.
- Gravity and flocculent assisted settling of solids from the water column.
- Redirection of sediment / turbid waters away from fish habitat by means of ditches, swales, and pumping.

In the case of the Milne Ore Pad drainage and collection system, construction of ditches commenced in late May. Ongoing sampling of the areas downstream of the Ore Pad stockpile indicated there was negligible impact from potential ore pad runoff. Prior to the construction of ditches around the ore pad, there were no visible flows discharging from the ore stockpile pad.

Impacted snow located along the Milne Port beach area, west of the ore loader area was excavated and stockpiled at a secure location away from fish habitat.

Attempts were made to clear snow under the bridges along the Tote Road, and the surface of the bridges were cleared of muddy material by means of manual methods.

5.2. Detailed work completed by area of concern

Refer to Appendix D for detailed list of actions taken during the reporting period, photos, and supplementary materials for each sediment release and area of concern:

Appendix D.1: Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake.
Appendix D.2: Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.
Appendix D.3: Spill Report 16-181- Mine Haul Road to Mary River and Sheardown Lake Tributary.
Appendix D.4: Spill Report 16-198 - Camp Lake Tributary 1
Appendix D.5: Spill Report 16-202 and Update No. 1 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Appendix D.6: Milne Port Ore Stockpile Drainage Collection System.
Appendix D.7: Milne Port Beach
Appendix D.8: Sediment on and under bridges along Tote Road.

6. Next Steps

6.1. Bi-weekly update reports

Bi-weekly update reports will be provided including any additional construction work completed and additional water sampling data. The next report will cover the period from June 18 to July 1, 2016.

6.2. Completed construction repairs

Construction repairs for the areas of concern including the Milne Port Ore Stockpile Drainage system and the Mine Site Crusher Stockpile Pad will be substantially completed by July 17, 2016.

6.3. Lessons-learned

Baffinland will conduct an extensive review and analyses of lessons- learned with regard to sedimentation issues along the roads and at the camps. Key conclusions and recommendations will be provided in the Completion Report which will be provided to regulators and inspectors. Baffinland will be open to any comments and recommendations received and will make revisions as is appropriate.

6.4. Long-term action plans

Longer term action plans related to dust mitigation and Tote Road work as related to drainage considerations will be provided by September 30, 2016.

6.5. Completion Report

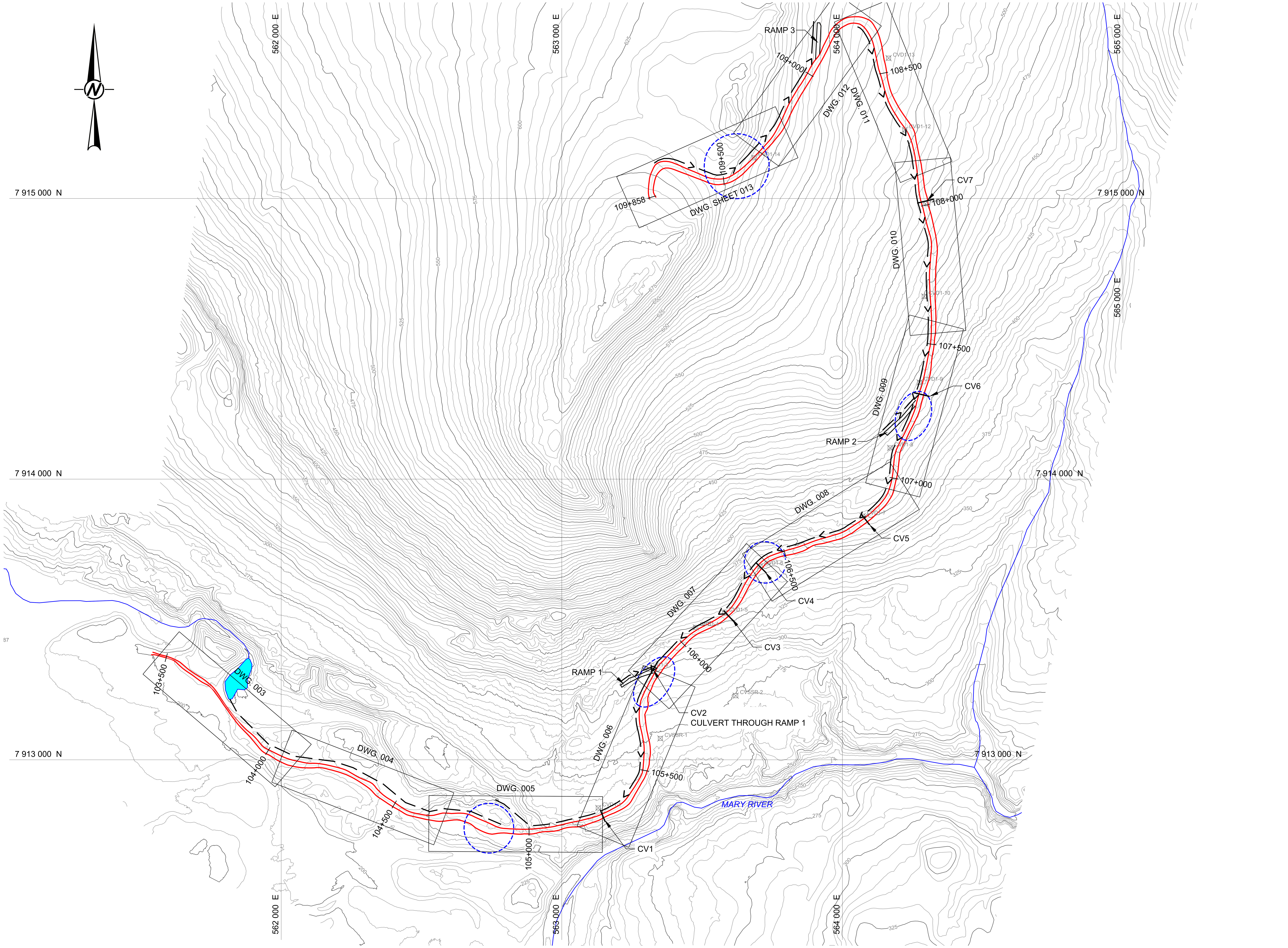
A completion report that summarizes the results of all work to date and is signed off by the CEO of the company will be provided by September 30, 2016.

APPENDIX A

OTHER MEASURES COMPLETED PRIOR TO FRESHET

Appendix A.1

Mine Haul Road



LEGEND

- AS-BUILT CULVERT (KNIGHT PIESOLD, 2008)
- APPROXIMATE AREA WITH WATER QUALITY CONCERNS IDENTIFIED BY BAFFINLAND OPERATIONS
- 108+000 — ROAD STATIONING AT CENTRELINE
- EXISTING ROAD
- BASE MAPPING CONTOUR
- WATERCOURSE
- CV3 — DESIGN PIPE CROSSING LOCATION
- DESIGN DITCH LOCATION
- PROPOSED DRAINAGE SWALE (AS REQUIRED)

NOTE(S)

1. COORDINATE GRID IS UTM (NAD83) ZONE 17 AND IS IN METRES.

NOT FOR CONSTRUCTION

0 250 500
1:7,500 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2016-03-18	ISSUED FOR CLIENT REVIEW	FZG	MJT	MJT	PMB

STAMP/SEAL

CLIENT
Baffinland

CONSULTANT
Golder Associates

MISSISSAUGA OFFICE
6925 CENTURY AVENUE, MISSISSAUGA
ONTARIO L5N 7K2
CANADA
[+1] (905) 567 6100
www.golder.com

PROJECT
MARY RIVER PROJECT
MINE HAUL ROAD
DRAINAGE IMPROVEMENT PROJECT

TITLE
GENERAL ARRANGEMENT PLAN

PROJECT NO.	PHASE	REV.	of	DRAWING
1649295	2000	A		002

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Path: \\golder.gds\GAL\Mississauga\SIM\Clients\Baffinland_Iron_Mines_Corp\Baffin_Island\99_PROJ\1649295\40_PROD\0001_Water_Mgmt\ | File Name: 1649295-0001-CM-0002.dwg

Culvert CV-1 Construction and Installation Photos – May 2016

Culvert CV-1 Construction and Installation Photos – May 2016

Culvert CV-2 Construction and Installation Photos – May 2016

Culvert CV-2 Construction and Installation Photos – May 2016

Mine Haul Road Ditching and Riprapping Photos – April 2016

Mine Haul Road Ditching and Riprapping Photos – April 2016

Mine Haul Road Ditching and Riprapping Photos – April 2016

Mine Haul Road Ditching and Riprapping Photos – April 2016

Mine Haul Road Ditching and Riprapping Photos – April 2016

Mine Haul Road Ditching and Riprapping Photos – April 2016

Appendix B

NT-NU Spill Reports

Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake.
Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.
Spill Report 16-181- Mine Haul Road to Mary River and Sheardown Lake Tributary.
Spill Report 16-198 - Camp Lake Tributary 1
Spill Report 16-202 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Spill Report 16-202 – Update 1 - Milne Inlet Tote Road, Tributaries to Muriel Lake (BG-31) and David Lake (BG-28)

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EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR **05-10-2016**	REPORT TIME **14:30 HRS**	☒ ORIGINAL SPILL REPORT, OR ☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER **16 - 158**
B	OCCURRENCE DATE: MONTH – DAY – YEAR **05-07-2016**	OCCURRENCE TIME **19:00 HRS**		

C	LAND USE PERMIT NUMBER (IF APPLICABLE) **IOL - Commercial Lease No.: Q13C301**	WATER LICENCE NUMBER (IF APPLICABLE) **2AM-MRY1325 Type "A"**
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION **Mary River Project Mine Site, Baffin Island, NU**	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS
F	RESPONSIBLE PARTY OR VESSEL NAME **Baffinland Iron Mines Corp.**	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION **2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3**
G	ANY CONTRACTOR INVOLVED **N/A**	CONTRACTOR ADDRESS OR OFFICE LOCATION **N/A**

H	PRODUCT SPILLED **sediment / discoloured water**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **Unquantified at present time**	U.N. NUMBER **N/A**
	SECOND PRODUCT SPILLED (IF APPLICABLE) **N/A**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **N/A**	U.N. NUMBER **N/A**
I	SPILL SOURCE **Melting snow**	SPILL CAUSE **suspected entrained dust**	AREA OF CONTAMINATION IN SQUARE METRES **N/A**
J	FACTORS AFFECTING SPILL OR RECOVERY **Snow covered area, poor access**	DESCRIBE ANY ASSISTANCE REQUIRED **N/A**	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT **N/A**

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On Saturday, May 7, 2016, a snowmelt event occurred at the Mine Site. Runoff containing sediments and discoloured water were observed to flow into Sheardown Tributary and Sheardown Lake at around 1900 HRS. The source of the suspected off-spec drainage was dirty snow located downwind of the Crusher Pad. The event resulted in some siltation/discoloured water in two streams flowing from adjacent areas onto and under the ice of Sheardown Lake. In accordance with the Surface Water Management Plan, controls were implemented that included installation of silt fences and the deployment of flocculent and treated jute to settle sediments prior to discharge. Further actions are planned that will reduce the potential impact from the dirty snow source area. Dirty snow removal, check dam/sump construction, and additional flocculation are being considered. Daily monitoring of the water quality and flow is ongoing. Spill report updates will be provided as warranted. A follow-up report documenting the occurrence and providing recommendations will be submitted within 30 days

L	REPORTED TO SPILL LINE BY **Jim Millard**	POSITION **Env Manager**	EMPLOYER **Baffinland**	LOCATION CALLING FROM **Mary River**	TELEPHONE **902-403-1337**
M	ANY ALTERNATE CONTACT **Allan Knight**	POSITION **Env Superintendent**	EMPLOYER **Baffinland**	ALTERNATE CONTACT LOCATION **647-253-0596**	ALTERNATE TELEPHONE **Ext 6016**

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

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REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR **05-17-2016**	REPORT TIME **19:00 hrs**	☒ ORIGINAL SPILL REPORT, OR ☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER **16 - 176**
B	OCCURRENCE DATE: MONTH – DAY – YEAR **05-17-2016**	OCCURRENCE TIME **09:00 hrs**		

C	LAND USE PERMIT NUMBER (IF APPLICABLE) **IOL - Commercial Lease: Q13C301**	WATER LICENCE NUMBER (IF APPLICABLE) **2AM-MRY1325 Type "A"**
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION **Mary River Mine Site, Baffin Island, NU**	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES **71** MINUTES **16** SECONDS **46**	LONGITUDE DEGREES **79** MINUTES **22** SECONDS **36**
F	RESPONSIBLE PARTY OR VESSEL NAME **Baffinland Iron Mines Corp.**	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION **2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3**
G	ANY CONTRACTOR INVOLVED **N/A**	CONTRACTOR ADDRESS OR OFFICE LOCATION **N/A**

H	PRODUCT SPILLED **Sediment**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **Unquantified at present time**	U.N. NUMBER **N/A**
	SECOND PRODUCT SPILLED (IF APPLICABLE) **N/A**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **N/A**	U.N. NUMBER **N/A**
I	SPILL SOURCE **Melt Water**	SPILL CAUSE **Warming Temps/Rain**	AREA OF CONTAMINATION IN SQUARE METRES **N/A**
J	FACTORS AFFECTING SPILL OR RECOVERY **Snow covered area, poor access**	DESCRIBE ANY ASSISTANCE REQUIRED **N/A**	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT **N/A**

K — ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On Tuesday, May 17, 2016, runoff containing sediments was observed to be flowing into Camp Lake Tributary # 1 and into Camp Lake around 0900 HRS. The source of the off-spec drainage was from an area adjacent to the airstrip. The event resulted in some siltation to the stream flowing into Camp Lake. In accordance with the Surface Water Management Plan, controls were implemented that included installation rip rap (6" aggregate) and the deployment of flocculent and treated jute to settle sediments prior to discharge. Further actions are planned that will reduce the potential impact from the source area. Spill report updates will be provided as warranted.

A follow-up report documenting the occurrence and providing recommendations will be submitted within 30 days

L	REPORTED TO SPILL LINE BY **Allan Knight**	POSITION **Env. Superintendent**	EMPLOYER **Baffinland**	LOCATION CALLING FROM **Mary River**	TELEPHONE **647-253-0596**
M	ANY ALTERNATE CONTACT **Jim Millard**	POSITION **Env. Manager**	EMPLOYER **Baffinland**	ALTERNATE CONTACT LOCATION **902-403-1337**	ALTERNATE TELEPHONE **6016**

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

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REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR **05-21-2016**	REPORT TIME **21:00 hrs**	[X] ORIGINAL SPILL REPORT, OR ☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER **16 - 181**
B	OCCURRENCE DATE: MONTH – DAY – YEAR **05-20-2016**	OCCURRENCE TIME **19:00 hrs**		

C	LAND USE PERMIT NUMBER (IF APPLICABLE) **IOL - Commercial Lease: Q13C301**	WATER LICENCE NUMBER (IF APPLICABLE) **2AM-MRY1325 Type "A"**
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION **Mary River Mine Site, Baffin Island, NU**	REGION ☐ NWT [X] NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS
F	RESPONSIBLE PARTY OR VESSEL NAME **Baffinland Iron Mines Corp.**	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION **2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3**
G	ANY CONTRACTOR INVOLVED **N/A**	CONTRACTOR ADDRESS OR OFFICE LOCATION **N/A**

H	PRODUCT SPILLED **Sediment**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **Unquantified at present time**	U.N. NUMBER **N/A**
	SECOND PRODUCT SPILLED (IF APPLICABLE) **N/A**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **N/A**	U.N. NUMBER **N/A**
I	SPILL SOURCE **Melt Water**	SPILL CAUSE **Melting of snow on road base**	AREA OF CONTAMINATION IN SQUARE METRES **N/A**
J	FACTORS AFFECTING SPILL OR RECOVERY **Snow covered area, poor access**	DESCRIBE ANY ASSISTANCE REQUIRED **N/A**	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT **N/A**

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On May 20 and 21, 2016, runoff containing sediment was observed to be flowing from the surface of the Mine Haul Road through several breaks (punch outs) on the outer edge of the road. The punch outs were installed to allow contact water on the road surface to be efficiently discharged from the road surface. On the afternoon of May 19, discharges of contact water increased and it became apparent that there was risk to Mary River and Sheardown tributary/Lake. The berm punch outs were sealed and road contact water has been diverted to three selected locations that will minimize potential flows to downstream fish habitat and water bodies. Check dams, silt fences/curtains, floculants are being utilized to assist with this initial effort. It is expected that the sediment will settle and will be discharged back to the receiving environment. Report updates will be provided with further information in the near future. This incident is being reported as required by the conditions of Water Licence No. 2AM-MRY1325 and as required by subsection 38(4) of the Fisheries Act.

L	REPORTED TO SPILL LINE BY **Jim Millard**	POSITION **Env. Manager**	EMPLOYER **Baffinland**	LOCATION CALLING FROM **Mary River**	TELEPHONE **647-253-0596**
M	ANY ALTERNATE CONTACT **Allan Knight**	POSITION **Env. Superintendent**	EMPLOYER **Baffinland**	ALTERNATE CONTACT LOCATION **902-403-1337**	ALTERNATE TELEPHONE **6016**

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

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REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 05-31-2016	REPORT TIME 11:00 hrs	☒ ORIGINAL SPILL REPORT, OR ☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER 16 - 198
B	OCCURRENCE DATE: MONTH – DAY – YEAR unknown - within last several days	OCCURRENCE TIME unknown		

C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Mine Site, Baffin Island, NU	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES 71 MINUTES 19 SECONDS 46	LONGITUDE DEGREES 79 MINUTES 22 SECONDS 41
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A

H	PRODUCT SPILLED Sediment	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES Unquantified at present time	U.N. NUMBER N/A
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 44m3	U.N. NUMBER N/A
I	SPILL SOURCE steep sandy stream bank	SPILL CAUSE warming temperatures	AREA OF CONTAMINATION IN SQUARE METRES 110m2
J	FACTORS AFFECTING SPILL OR RECOVERY poor access	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On Sunday, May 29, 2016, during an environmental inspection of Mine Site drainages a deposit of sediments was discovered in Camp Lake Tributary #1 (CLT1), south of the Tote Road. Upon initial investigation, the source of the sediment was from a stream bank failure. The embankment failure may have been caused by water draining from the airstrip. The event resulted in sandy deposit of material that partially encroached on the stream. Once discovered, silt fences were erected around the sediment deposit. A schedule is being developed for the removal of the sediment and stabilization of the stream embankment at that location. The water will be rerouted from this location and redirected to an area that is more stable. The material is coarse sand and does not appear to be mobile in water. A follow-up report documenting the occurrence and providing recommendations will be submitted within 30 days.

L	REPORTED TO SPILL LINE BY Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE 647-253-0596
M	ANY ALTERNATE CONTACT Allan Knight	POSITION Env. Superintendent	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION 902-403-1337	ALTERNATE TELEPHONE 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

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REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR **06-02-2016**	REPORT TIME **0700 HRS**	☒ ORIGINAL SPILL REPORT, OR ☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER **16 - 202**
B	OCCURRENCE DATE: MONTH – DAY – YEAR **05-31-2016**	OCCURRENCE TIME **2100 HRS**		
C	LAND USE PERMIT NUMBER (IF APPLICABLE) **IOL - Commercial Lease: Q13C301**	WATER LICENCE NUMBER (IF APPLICABLE) **2AM-MRY1325 Type "A"**		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION **Mary River Mine Site, Baffin Island, NU**	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS		
F	RESPONSIBLE PARTY OR VESSEL NAME **Baffinland Iron Mines Corp.**	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION **2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3**		
G	ANY CONTRACTOR INVOLVED **N/A**	CONTRACTOR ADDRESS OR OFFICE LOCATION **N/A**		
H	PRODUCT SPILLED **Sediment**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **Unquantified at present time**	U.N. NUMBER **N/A**	
	SECOND PRODUCT SPILLED (IF APPLICABLE) **N/A**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **N/A**	U.N. NUMBER **N/A**	
I	SPILL SOURCE **Freshet erosion**	SPILL CAUSE **warming temperatures**	AREA OF CONTAMINATION IN SQUARE METRES **N/A**	
J	FACTORS AFFECTING SPILL OR RECOVERY **N/A**	DESCRIBE ANY ASSISTANCE REQUIRED **N/A**	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT **N/A**	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

During an environmental inspection of the Milne Tote Road on May 31, three locations were observed where there was turbid water and sediment present in culvert outlet locations. These locations were stream crossings CV-223 at km 97, BG-17 at km 90, and BG-29 at km 85. The source of the sediment is erosion from spring freshet. There are no fish present at these locations because flows are very low and fish have not yet started to move into the stream. In the meantime silt fences and in-ditch flocculant have been deployed as appropriate Sediments in culvert outlet basins will be carefully excavated and removed under the supervision of Environment staff within the next several days. In addition, the embankment areas of these streams are scheduled to receive riprap/geotextile shortly.

L	REPORTED TO SPILL LINE BY **Jim Millard**	POSITION **Env. Manager**	EMPLOYER **Baffinland**	LOCATION CALLING FROM **Mary River**	TELEPHONE **647-253-0596**
M	ANY ALTERNATE CONTACT **Allan Knight**	POSITION **Env. Superintendent**	EMPLOYER **Baffinland**	ALTERNATE CONTACT LOCATION **902-403-1337**	ALTERNATE TELEPHONE **6016**

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

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EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 06-19-2016	REPORT TIME 2200 HRS	☐ ORIGINAL SPILL REPORT, OR ☒ UPDATE # 1 TO THE ORIGINAL SPILL REPORT	REPORT NUMBER 16 - 202
B	OCCURRENCE DATE: MONTH – DAY – YEAR 06-18-2016	OCCURRENCE TIME Unknown		

C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Mine Site, Baffin Island, NU	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A

H	PRODUCT SPILLED Sediment	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES Unquantified at present time	U.N. NUMBER N/A
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A
I	SPILL SOURCE Freshet melting snowpack	SPILL CAUSE warming temperatures	AREA OF CONTAMINATION IN SQUARE METRES N/A
J	FACTORS AFFECTING SPILL OR RECOVERY N/A	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

During an environmental inspection of the Milne Tote Road on June 18, two locations were observed where there was turbid water and sediment present near stream crossings, downstream of Tote Road. These locations were BG-31 at km 82 and BG-28 at km 86.3. The sediment appears to be generated by the melting snow pack adjacent to the road. The streams are not expected to be fish habitat, although flow from these locations is to Muriel Lake (BG-31) and David Lake (BG-28). The sediment is being controlled from entering the lakes at these locations by the construction of check dams and silt curtain for stream BG-31 and by silt fence and silt curtain at BG-28. Previous locations where there was sediment and turbid water at stream crossings CV-223 at km 97, BG-17 at km 90, and BG-29 at km 85, are now running clear and sediment at culvert outlets was removed.

L	REPORTED TO SPILL LINE BY Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE 647-253-0596
M	ANY ALTERNATE CONTACT Allan Knight	POSITION Env. Superintendent	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION 902-403-1337	ALTERNATE TELEPHONE 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Appendix C

Surface Water Quality and Acute Toxicity Results for Affected Areas

(Refer to Biweekly Report No. 6)

Appendix D

Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

(Refer to Biweekly Report No. 6 for Complete List of Actions Taken)

Appendix D.1 - Photos

Photo 1 – Silt fence installation along road to prevent road runoff from directly discharging into Sheardown Lake Tributary (SDLT) near CV186.

Photo 2 – May 9th 2016. Flocculant stations installed along Sheardown Lake Tributary SDLT and LDFG.

Photo 3 – Treated Jute installed at Check Dam #1 to capture sediments within runoff.

Photo 4 – Sand bag check dams installed along Sheardown Lake Tributary LDFG near landfill access road.

Photo 5 - Improved water clarity and total suspended solid levels at outfall of Sheardown Lake Tributary SDLT following implementation of siltation control measures.

Appendix D.2 – Photos

Photo 1 –Airstrip runoff entering Camp Lake Tributary #1.

Photo 2 – Swale draining airstrip runoff lined with 6” aggregate and treated jute to capture sediments.

Photo 3 – May 30th 2016. Daily sampling and monitoring of Camp Lake Tributary #1 discharge at Camp Lake outfall.

Photo 4 – Improved water clarity and total suspended solid levels at Camp Lake Tributary #1 following implementation of siltation control measures.

Appendix D.3 – Photos

Photo 1– April 28th 2016. Construction of Check Dam # 4 near the end of Magazine Access Road.

Photo 2 – Mine Haul Road runoff pooling upstream of Check Dam # 4

Photo 3 – Flocculant dosing system treating water upstream of Check Dam #4.

Photo 4 – Discharge of flocculant dosing system at Check Dam #4.

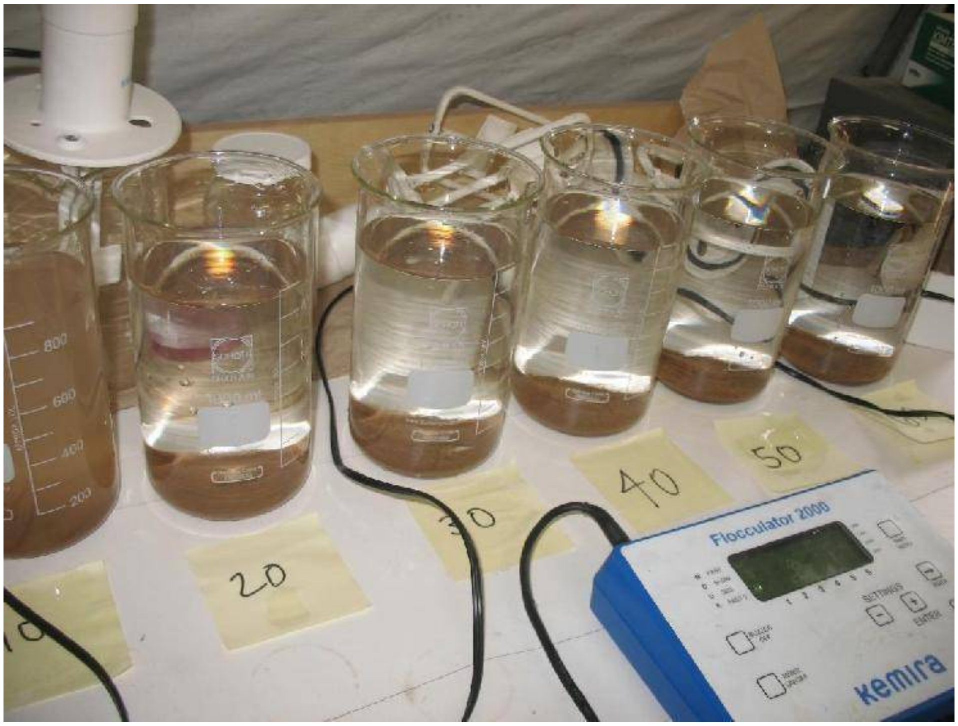


Photo 5 – Laboratory testing for flocculant dosing optimization.


Photo 6 – Check dam constructed at outlet of Sheardown Valley along Mine Haul Road.

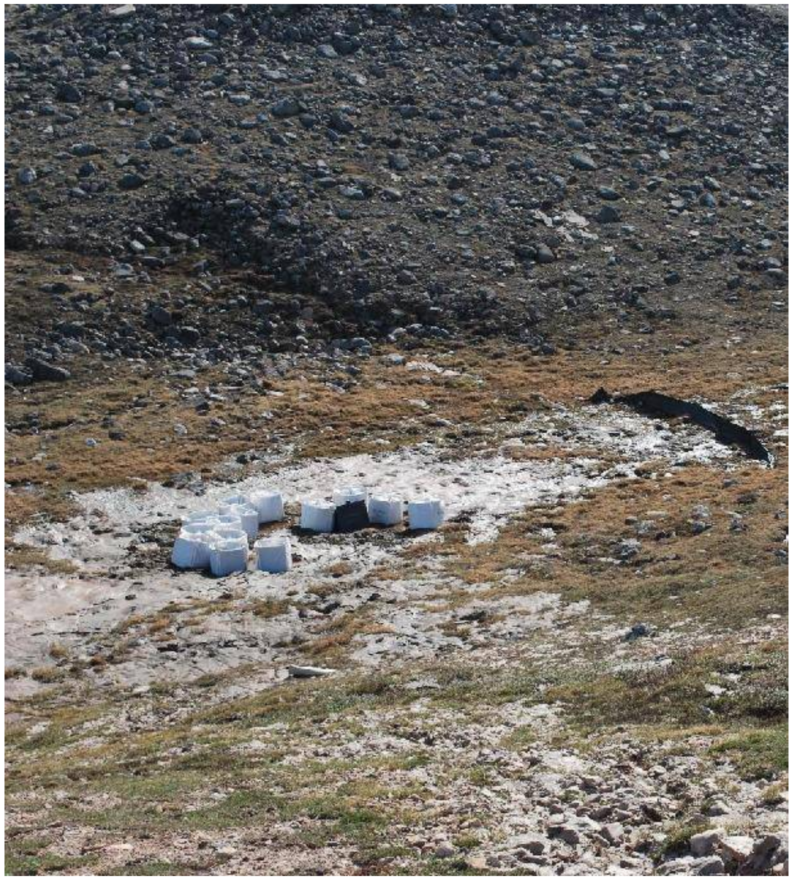


Photo 7 – Sediment deposit removal along upper reaches of Sheardown Lake Tributary SDLT (downstream of km 104.5 of the Mine Haul Road).

Appendix D.4 – Photos

Photo 1 – May 29th 2016. Silt fence installation around sediment deposit from slumping stream bank along Camp Lake Tributary #1.

Photo 2 – June 3rd 2016. Snow along slumping slope face and sediment deposit removed.

Photo 3 – June 3rd 2016. Slumping stream bank lined with geotextile to protect underlying soil from erosion.

Photo 4 – June 4th 2016.Slumping stream bank reinforced with 6” aggregate.

km 97 - CV223

Constructed Drainage Controls Partially Implemented or Completed.

km 91.1

Photos Prior to Construction of Drainage Controls

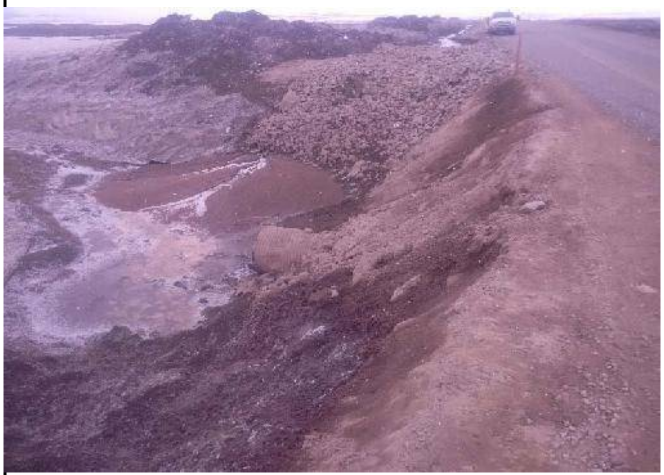
Constructed Drainage Controls Partially Implemented or Completed.

km 82.2

Constructed Drainage Controls Partially Implemented or Completed.

km 96 - CV224

Photos Prior to Construction of Drainage Controls




Constructed Drainage Controls Partially Implemented or Completed.



km 90 - BG17

Photos Prior to Construction of Drainage Controls

Constructed Drainage Controls Partially Implemented or Completed.

Appendix D.6 – Photos of Milne Ore Stock Pile Drainage Works Construction

Photo 1 – June 6 2016.

Photo 2 – June 7 2016.


Photo 3 – June 7 2016.


Photo 4 – June 2 2016.

Appendix D.7 – Photos of Impacted Snow Removal from Milne Beach

Photo 1 – May 20-21 2016.

Photo 2 – May 20-21 2016.

Photo 3 – June 1 2016.

Photo 4-June 1 2016

Photos of removal of Dirty Snow Material from Bridge Km17

Photo 5 – May 21 2016.

BIWEEKLY REPORTS

(ABBREVIATED)

Report on Actions Taken:

June 7th 2016, Fisheries Act Direction (File number: 4408-2016-05-10-001) and

Response to June 16, 2016, INAC Letter of Non-Compliance

Bi-Weekly Report No. 1 for Period June 25 to July 9, 2016

July 8, 2016

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D.7 - Removal of Impacted Snow: Milne Beach and Tote Road Bridges

Report Basis

The document provided, herein, is the first bi-weekly progress report as required under the June 7 Fisheries Direction provided by Environment Canada (page 6, Measures to be Taken, Item 1) and reports on the period June 25 through July 8. Specifically, the bi-weekly reports are to provide updates on the actions taken to address sedimentation issues and ongoing actions being taken at the site to address Items 2 and 3 as outlined in the Fisheries Direction. Previous actions, including pre-freshet actions, were reported on in the June 24th, 2016, Report on Actions Taken.

1. Unauthorized Releases and Contributing Factors

A number of unauthorized releases of sediment were reported to Environment Canada, Indigenous and Northern Affairs Canada, and the NT-NU Spill Line during the month of May and June. These included the Spill Report numbers 16-158, 16-176, 16-181, 16-198, 116-202, and 116-202 Update No. 1. Copies of the original Spill Reports are provided in Appendix A. During the current reporting period, there were no further unauthorized sediment releases.

As of July 8, the potentially affected drainages continue to run visually clear of sediment, and the residual snow pack in upstream areas has been substantially released. Based on visual observations, Freshet flows have peaked and is now waning. Lake ice is still present on the larger lakes of the area (Camp Lake, Sheardown Lake, David Lake, Muriel Lake, and Mary Lake) but there is significant melt out from the shorelines. There were no significant rainfall or snowfall events during the reporting period.

2. Retention of Third Party Expertise

When sediment release events were first observed and reported, third party expertise was retained and these individuals were brought to site. A list of those individuals and support provided was detailed in the June 24th, 2016, Report on Actions Taken. We continue discussions with those various individuals to provide advice as warranted. During the reporting period, the following consultants/contractors visited site and provided assistance.

- Nuna East Ltd. - A Construction Engineer and Construction Team from Nuna East Ltd. constructed/installed additional sedimentation control structures along the Mine Haul Road and Tote Road during the reporting period. These areas requiring work were further developed based on observed conditions during freshet. This list of additional priority areas is provided as Table C.4.2 (Appendix C).
- AMEC Foster Wheeler and Kemira Chemical – A process engineering team was retained to continue to study and test the effectiveness of various polymers in treating sediment laden waters that were observed along the Mine Haul Road. Intermediate level water treatment professionals continue to be brought to site over the reporting period in late May to further study the viability polymer treatment of sediment-impacted runoff waters. Several polymers have been selected for further study and procurement.

3. Water Quality and Acute Toxicity Sampling Results for Areas of Concern

Spill Reports for sediment releases are provided in Appendix A. Potential receivers for the sediment releases included Sheardown Lake, Sheardown Lake Tributary, Camp Lake, Camp Lake Tributaries, Mary River and Mary River Tributaries, David Lake and David Lake Tributaries, Muriel Lake and Muriel Lake Tributaries.

Available water quality and acute toxicity results for Sheardown Lake, Camp Lake, and Mary River systems are provided in Appendix B. These results include results provided in the June 24 initial report as well as any new results reported during the current reporting period. GPS coordinates and maps are provided to show approximate sample locations as well as the location of structures that were installed to mitigate the sediment concerns. Water quality data has been compared to the Effluent Quality Discharge Limits for Contact Water (Table 11) provided in the Type “A” Water Licence No. 2AM-MRY1325 for the Mary River Project, which are summarized in the table below:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	15	30
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Note that in areas where there is or has been active construction, the following effluent discharge limits apply:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	50	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

During the current June 25 to July 8 reporting period, there were no exceedances of the Type A Water Licence criteria. A number of laboratory TSS and turbidity results remain in progress (IP). These include results from Mary River (upstream and downstream), and at various stream crossings along the Tote Road (upstream and downstream) where there were unauthorized releases. Field turbidity values for the Tote Road stream crossings are available and included in Appendix B.

Due to the excellent water quality results over the reporting period for the areas of concern, further acute toxicity analyses was not performed. Previous acute toxicity analyses have shown non-lethal results from the discharge water samples that were collected and reported previously.

Water sampling will continue on a regular basis, and additional data, including laboratory results that are in progress for this reporting period, will be included in future bi-weekly update reports.

4. Corrective Measures for Reported Spills and Other Concerns

4.1. Immediate actions undertaken to address issues

A number of immediate actions were undertaken to address sediment releases to water bodies that were documented in the Spill Reports submitted to authorities. These actions were presented previously in the June 24th, 2016, Report on Actions Taken.

In the case of the Milne Ore Pad drainage and collection system, construction of ditches commenced in late May and were substantially completed in mid-June. The ditching system is currently functional and performance is under observation and assessment. A Hatch Consulting representative completed a site tour of the facility for the purpose of collection of data for the purpose of the as-built construction documents. Secondary ditch, berm, and swale construction for Mine Site Crusher Stockpile area was in progress during the reporting period. Primary/main ditch construction was completed during 2015.

4.2. Detailed work completed by area of concern

Any new work actions taken during the June 25 to July 8 reporting period for the areas of concern are provided in Appendix C. Actions, if taken, are appended to the overall action list provided in the previous work action lists. In addition, new photos for the current reporting period are provided as warranted.

Appendix C.1: Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake.
Appendix C.2: Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.

Appendix C.3: Spill Report 16-181- Mine Haul Road to Mary River and Sheardown Lake Tributary.
Appendix C.4: Spill Report 16-198 - Camp Lake Tributary 1
Appendix C.5: Spill Report 16-202 and Update No. 1 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Appendix C.6: Milne Port Ore Stockpile Drainage Collection System.
Appendix C.7: Milne Port Beach
Appendix C.8: Sediment on and under bridges along Tote Road.

5. Next Steps

5.1. Bi-weekly update reports

Bi-weekly update reports will continue to be provided including any additional construction work completed and additional water sampling data. The next report will cover the period from July 9 to July 22, 2016.

5.2. Completed construction repairs

Construction repairs for the areas of concern including the Milne Port Ore Stockpile Drainage system and the Mine Site Crusher Stockpile Pad will be substantially completed by July 17, 2016.

5.3. Lessons-learned

Baffinland will conduct an extensive review and analyses of lessons- learned with regard to sedimentation issues along the roads and at the camps. Key conclusions and recommendations will be provided in the Completion Report which will be provided to regulators and inspectors. Baffinland will be open to any comments and recommendations received and will make revisions as is appropriate.

5.4. Long-term action plans

Longer term action plans related to dust mitigation and Tote Road work as related to drainage considerations will be provided by September 30, 2016.

5.5. Completion Report

A completion report that summarizes the results of all work to date and is signed off by the CEO of the company will be provided by September 30, 2016.

Appendix A

NT-NU Spill Reports

(Refer to Report No. 1)

Appendix B

Surface Water Quality and Acute Toxicity Results for Affected Areas

(Refer to Biweekly Report No. 6)

Appendix C

Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

(Refer to Biweekly Report No. 6 for Complete List of Actions Taken)

Appendix C.1 - Photos

Photo 1 – Outlet at Sheardown Lake Tributary on July 4, 2016

Photo 2 – Sheardown Lake Tributary upstream of CV186 on July 4, 2016

Photo 3 – No flow conditions at Landfill Gate Tributary on July 7, 2016

Appendix C.2 – Photos

Photo 1 –Outfall to Camp Lake Tributary #1 on July 4, 2016

Photo 2 – Camp Lake Tributary #1 on July 4, 2016

Appendix C.3 – Photos

Photo 1– Checkdam #5 constructed at Km 108.5. Picture taken on July 5, 2016.

Photo 2 – Silt Fences and Checkdam #5 at Km 108.5. Picture taken on July 5, 2016.

Photo 4 - New ditch with geotextile and rip rap up from Km 108.5. Picture taken on July 5, 2016

Photo 4 - New ditch with geotextile and rip rap at downhill from Km 108.5. Picture taken on July 5, 2016

Appendix C.4 – Photos

Photo 1 – Update on stable slope face by Camp Lake Tributary #1. Picture taken on July 7, 2016

Appendix C.5 – Photos at various locations along the Tote Road

Photo 1 – BG-31. New culvert installation at Km 82 reduces siltation downstream

Photo 2 – BG -31 flowing clear downstream of culvert

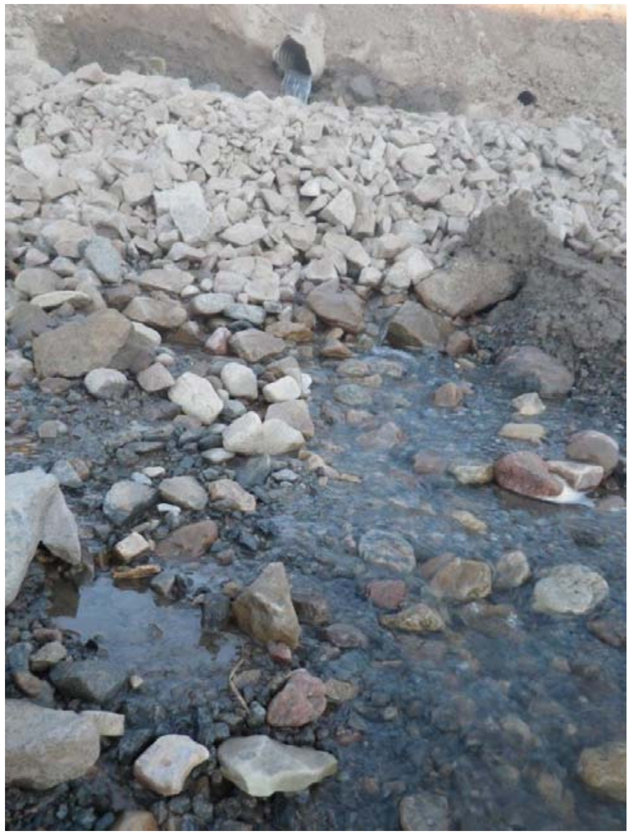

Photo 3 – BG-28 flowing clear at Km 86.5.

Photo 4- Rip rap in ditch at Km 85

Photo 5: Rip rap in ditch at Km 85

Baffinland

Report on Actions Taken:

June 7th 2016, Fisheries Act Direction (File number: 4408-2016-05-10-001) and

Response to June 16, 2016, INAC Letter of Non-Compliance

Bi-Weekly Report No. 2 for Period July 9 to July 22, 2016

July 22, 2016

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C.6- Milne and Mine Site Drainage Works
C.7- Removal of Impacted Snow: Milne Beach and Tote Road Bridges

Report Basis

The document provided, herein, is the second bi-weekly progress report as required under the June 7 Fisheries Direction provided by Environment Canada (page 6, Measures to be Taken, Item 1) and reports on the period July 9 through July 22. Specifically, the bi-weekly reports are to provide updates on the actions taken to address sedimentation issues and ongoing actions being taken at the site to address Items 2 and 3 as outlined in the Fisheries Direction. Previous actions, including pre-freshet actions, were reported on in the June 24th, 2016, Report on Actions Taken and July 8 Bi-Weekly Report No. 1.

1. Unauthorized Releases and Contributing Factors

A number of unauthorized releases of sediment were reported to Environment Canada, Indigenous and Northern Affairs Canada, and the NT-NU Spill Line during the month of May and June. These included the Spill Report numbers 16-158, 16-176, 16-181, 16-198, 116-202, and 116-202 Update No. 1. Copies of the original Spill Reports are provided in Appendix A. During the current reporting period, there were no further unauthorized sediment releases.

As of July 22, the potentially affected drainages continue to run visually clear of sediment, and the residual snow pack in upstream areas have been fully released. Based on visual observations, Freshet flows have subsided. Lake ice is no longer present on the larger lakes of the area (Camp Lake, Sheardown Lake, David Lake, Muriel Lake, and Mary Lake). There were minor rainfall events during the reporting period.

2. Retention of Third Party Expertise

When sediment release events were first observed and reported, third party expertise was retained and these individuals were brought to site. A list of those individuals and support provided was detailed in the June 24th, 2016, Report on Actions Taken. We continue discussions with those various individuals to provide advice as warranted. During the reporting period, the following consultants/contractors provided assistance:

- Nuna East Ltd. - A Construction Team consisting of Nuna East Ltd. Equipment operator supported by Baffinland Mine Operations personnel continued to work on completion of the Mine Crusher Pad ditching project.
- Technical advisors from AMEC Foster Wheeler and Kemira Chemical were available to site personnel during the reporting period for the purpose of providing technical guidance on water treatment of runoff if required. However, their services were not required during the reporting period due to the clear flows.
- Initial consultation with Golder and AMEC Foster Wheeler has taken place to discuss the Dust Mitigation Action Plan and the Tote Road and Mine Hall Road Mitigation Action Plan.

3. Water Quality and Acute Toxicity Sampling Results for Areas of Concern

Spill Reports for sediment releases are provided in Appendix A. Potential receivers for the sediment releases included Sheardown Lake, Sheardown Lake Tributary, Camp Lake, Camp Lake Tributaries, Mary River and Mary River Tributaries, David Lake and David Lake Tributaries, Muriel Lake and Muriel Lake Tributaries.

Available water quality and acute toxicity results for Sheardown Lake, Camp Lake, and Mary River systems are provided in Appendix B. These results include data provided in the June 24 and July 8 reports, as well as new results that became available during the current reporting period. New sampling locations with corresponding laboratory results include the Mary River (upstream and downstream of the Mine Site), and various stream crossings along the Tote Road (upstream and downstream of the road) where unauthorized releases were reported. GPS coordinates and maps are provided to show approximate sample locations as well as the location of structures that were installed to mitigate the sediment concerns.

Water quality results have been compared to the Effluent Quality Discharge Limits for Contact Water (Table 11) provided in the Type "A" Water Licence No. 2AM-MRY1325 for the Mary River Project, which are summarized in the table below:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	15	30
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Note that in areas where there is or has been active construction, the following effluent discharge limits apply:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	50	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

During the current July 9 to July 22 reporting period, there were no exceedances of the Type A Water Licence criteria. Due to the excellent water quality results over the reporting period for the areas of concern, further acute toxicity analyses was not performed. Previous acute toxicity analyses have shown non-lethal results from the discharge water samples that were collected and reported previously.

Water sampling will continue on a periodic basis, and additional data, including laboratory results that are in progress for this reporting period, will be included in future bi-weekly update reports.

4. Corrective Measures for Reported Spills and Other Concerns

4.1. Immediate actions undertaken to address issues

A number of immediate actions were undertaken to address sediment releases to water bodies that were documented in the Spill Reports submitted to authorities. These actions were presented previously in the June 24th and July 8, 2016, Report on Actions Taken.

In the case of the Milne Ore Pad and the Mine Site Ore Pad drainage and collection systems, construction of ditch systems were completed by June 15 and July 15, respectively. As of those dates, the ditching systems were functional and currently performance is under observation and evaluation. Construction Summary Reports (CSRs) for the facilities are currently in preparation and will be submitted to the Nunavut Water Board within three months after the substantial completion of construction.

4.2. Detailed work completed by area of concern

Any new work actions taken during the July 9 to July 22 reporting period for the areas of concern are provided in Appendix C. Actions, if taken, are appended to the overall action list provided in the previous work action lists. In addition, new photos for the current reporting period are provided as warranted. Appendix C is subdivided as follows:

Appendix C.1: Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake.
Appendix C.2: Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.
Appendix C.3: Spill Report 16-181- Mine Haul Road to Mary River and Sheardown Lake Tributary.
Appendix C.4: Spill Report 16-198 - Camp Lake Tributary 1

Appendix C.5: Spill Report 16-202 and Update No. 1 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Appendix C.6: Milne Port Ore Stockpile Drainage Collection System.
Appendix C.7: Milne Port Beach
Appendix C.8: Sediment on and under bridges along Tote Road.

5. Next Steps

5.1. Bi-weekly update reports

Bi-weekly update reports will continue to be provided including any additional construction work completed and additional water sampling data. The next report will cover the period from July 23 to August 5, 2016.

5.2. Completed construction repairs

Construction repairs for the areas of concern including the Milne Port Ore Stockpile Drainage system and the Mine Site Crusher Stockpile Pad have been substantially completed by the established July 17, 2016, deadline.

5.3. Lessons-learned

Baffinland will conduct an extensive review and analyses of lessons- learned with regard to sedimentation issues along the roads and at the camps. Key conclusions and recommendations will be provided in the Completion Report which will be provided to regulators and inspectors. Baffinland will be open to any comments and recommendations received and will make revisions as appropriate.

5.4. Long-term action plans

Longer term action plans related to Dust Mitigation and Tote Road Action Plans as related to drainage considerations are underway and will be provided by September 30, 2016.

5.5. Completion Report

A completion report that summarizes the results of all work to date and is signed off by the CEO of the company will be provided by September 30, 2016.

Appendix A

NT-NU Spill Reports

(Refer to Report No. 1)

Appendix B

Surface Water Quality and Acute Toxicity Results for Affected Areas

(Refer to Biweekly Report No. 6)

Appendix C

Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

(Refer to Biweekly Report No. 6 for Complete List of Actions Taken)

Appendix C.1 - Photos

Photo 1 – Outlet at Sheardown Lake Tributary on July 19, 2016

Photo 2 – Upstream at Sheardown Lake Tributary on July 19, 2016


Photo 3 – Flow conditions at Landfill Gate Tributary on July 19, 2016

Appendix C.2 – Photos

Photo 1 – Camp Lake Tributary #1 on July 19, 2016

Appendix C.4 – Photos

Photo 1 – Update on stable slope face by Camp Lake Tributary #1 on July 22, 2016.

Appendix C.5 – Photos at various locations along the Tote Road

Photo 1 – Water flowing downstream of CV223 on July 22, 2016

Photo 2 – Outlet of CV223 with armoured slope on July 22, 2016


Photo 3 – Clear flow at outlet of BG-17 with armoured banks on July 22, 2016


Photo 4 – Outlet of BG-28 flowing clear on July 17, 2016

Photo 5 – BG-29 flowing clear at outlet on July 22, 2016

Photo 6 – BG -31 flowing clear downstream of culvert on July 17, 2016

Appendix C.6 - Photos

Photo 1 – Aerial view of completed ditch work at the Mine Site Crusher Pad on July 18, 2016

Photo 2 – Completed ditch work at the Milne Port Ore Pad on July 18, 2016

Photo 3 – Aerial view of completed ditch work at the Milne Port Ore Pad on July 18, 2016

Report on Actions Taken:

June 7th 2016, Fisheries Act Direction (File number: 4408-2016-05-10-001) and

Response to June 16, 2016, INAC Letter of Non-Compliance

Bi-Weekly Report No. 3 for Period July 23 to August 5, 2016

August 5, 2016

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Spill Report 16-202 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Spill Report 16-202 – Update 1 - Milne Inlet Tote Road, Tributaries to Muriel Lake (BG-31) and David Lake (BG-28)

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C.7 - Removal of Impacted Snow: Milne Beach and Tote Road Bridges

Report Basis

The document provided, herein, is the third -bi-weekly progress report as required under the June 7 Fisheries Direction provided by Environment Canada (page 6, Measures to be Taken, Item 1) and reports on the period July 23 through August 5. Specifically, the bi-weekly reports are to provide updates on the actions taken to address sedimentation issues and ongoing actions being taken at the site to address Items 2 and 3 as outlined in the Fisheries Direction. Previous actions, including pre-freshet actions, were reported on in the June 24th, 2016, Report on Actions Taken and the July 8 and July 22 Bi-Weekly Reports Nos. 1 and 2.

1. Unauthorized Releases and Contributing Factors

A number of unauthorized releases of sediment were reported to Environment Canada, Indigenous and Northern Affairs Canada, and the NT-NU Spill Line during the month of May and June. These included the Spill Report numbers 16-158, 16-176, 16-181, 16-198, 116-202, and 116-202 Update No. 1. Copies of the original Spill Reports are provided in Appendix A. During the current reporting period, there were no further unauthorized sediment releases reported.

As of August 5, the potentially affected drainages continue to run, for the most part, visually clear of sediment. There were moderate rainfall events during the reporting period which resulted is some minor turbidity in Camp Lake Tributary and tributaries discharging to Mary River, especially during the early August period. Sampling has been completed for this period and results are forthcoming and will be provided in the next bi-weekly report. A natural sedimentation event, unrelated to Project activities, occurred upstream on Mary River (10 km upstream of Deposit No. 1) during the reporting period, causing the waters of Mary River to flow visually brown in colour in the vicinity of the Mine Site.

2. Retention of Third Party Expertise

When sediment release events were first observed and reported, third party expertise was retained and these individuals were brought to site. A list of those individuals and support provided was detailed in the June 24th, 2016, Report on Actions Taken. We continue discussions with those various individuals to provide advice as warranted. During the reporting period, the following consultants/contractors provided assistance:

- In early August, Golder was selected as the key consultant to support Baffinland in the development of the Dust Mitigation Action Plan and the Tote Road and Mine Haul Road Mitigation Action Plans.

3. Water Quality and Acute Toxicity Sampling Results for Areas of Concern

Spill Reports for sediment releases are provided in Appendix A. Potential receivers for the sediment releases included Sheardown Lake, Sheardown Lake Tributary, Camp Lake, Camp Lake Tributaries, Mary River and Mary River Tributaries, David Lake and David Lake Tributaries, Muriel Lake and Muriel Lake Tributaries.

Available water quality and acute toxicity results for Sheardown Lake, Camp Lake, and Mary River systems are provided in Appendix B. These results include data provided in the June 24, July 8, and July 22 reports, as well as new results that became available during the current reporting period. GPS coordinates and maps are provided to show approximate sample locations as well as the location of structures that were installed to mitigate the sediment concerns.

Water quality results have been compared to the Effluent Quality Discharge Limits for Contact Water (Table 11) provided in the Type "A" Water Licence No. 2AM-MRY1325 for the Mary River Project, which are summarized in the table below:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	15	30
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Note that in areas where there is or has been active construction, the following effluent discharge limits apply:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	50	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

During the current July 23 to August 5 reporting period, there were no exceedances of the Type A Water Licence criteria. Minor turbid conditions were observed along Camp Lake Tributary outlet, however, water samples from early August period were not available for this location for inclusion in this report. These results will be included during the next reporting period.

Due to the acceptable water quality results over the reporting period for the areas of concern, further acute toxicity analyses was not performed. Previous acute toxicity analyses have shown non-lethal results from the discharge water samples that were collected and reported previously.

Water sampling will continue on a periodic basis, and additional data, including laboratory results that are in progress for this reporting period, will be included in future bi-weekly update reports.

4. Corrective Measures for Reported Spills and Other Concerns

4.1. Immediate actions undertaken to address issues

A number of immediate actions were undertaken to address sediment releases to water bodies that were documented in the Spill Reports submitted to authorities. These actions were presented previously in the reports provided on June 24, July 8, and July 22, 2016 (Reports on Actions Taken).

In the case of the Milne Ore Pad and the Mine Site Ore Pad drainage and collection systems, construction of ditch systems were completed by June 15 and July 15, respectively. As of those dates, the ditching systems were functional and currently performance is under observation and evaluation. Construction Summary Reports (CSRs) for the facilities are currently in preparation and will be submitted to the Nunavut Water Board within three months after the substantial completion of construction.

4.2. Detailed work completed by area of concern

Any new work actions taken during the July 23 to August 5 reporting period for the areas of concern are provided in Appendix C. Actions, if taken, are appended to the overall action list provided in the previous work action lists. In addition, new photos for the current reporting period are provided as warranted. Appendix C is subdivided as follows:

Appendix C.1: Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake.
Appendix C.2: Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.
Appendix C.3: Spill Report 16-181- Mine Haul Road to Mary River and Sheardown Lake Tributary.
Appendix C.4: Spill Report 16-198 - Camp Lake Tributary 1
Appendix C.5: Spill Report 16-202 and Update No. 1 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Appendix C.6: Milne Port Ore Stockpile Drainage Collection System.
Appendix C.7: Milne Port Beach
Appendix C.8: Sediment on and under bridges along Tote Road.

5. Next Steps

5.1. Bi-weekly update reports

Bi-weekly update reports will continue to be provided including any additional construction work completed and additional water sampling data. The next report will cover the period from August 6 to 19, 2016.

5.2. Completed construction repairs

Construction repairs for the areas of concern including the Milne Port Ore Stockpile Drainage system and the Mine Site Crusher Stockpile Pad have been substantially completed by the established July 17, 2016, deadline.

5.3. Lessons-learned

Baffinland will conduct an extensive review and analyses of lessons- learned with regard to sedimentation issues along the roads and at the camps. Key conclusions and recommendations will be provided in the Completion Report which will be provided to regulators and inspectors. Baffinland will be open to any comments and recommendations received and will make revisions as is appropriate.

5.4. Long-term action plans

Longer term action plans related to dust mitigation and Tote Road work as related to drainage considerations are underway and will be provided by September 30, 2016.

5.5. Completion Report

A completion report that summarizes the results of all work to date and is signed off by the CEO of the company will be provided by September 30, 2016.

Appendix A

NT-NU Spill Reports

(Refer to Report No. 1)

Appendix B

Surface Water Quality and Acute Toxicity Results for Affected Areas

(Refer to Biweekly Report No. 6)

Appendix C

Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

(Refer to Biweekly Report No. 6 for Complete List of Actions Taken)

Appendix C.1 - Photos

Photo 1 – Outlet at Sheardown Lake Tributary on July 25, 2016

Photo 2 – Upstream at Sheardown Lake Tributary on July 25, 2016


Photo 3 – Flow conditions at Landfill Gate Tributary on July 25, 2016


Photo 4 – Outlet at Landfill Gate Tributary on July 25, 2016

Appendix C.2 – Photos

Photo 1 – Camp Lake Tributary #1 on July 25, 2016

Photo 2 – Upstream Camp Lake Tributary #1 on July 25, 2016

Appendix C.3 – Photos Not Required (No Change from Report Update No. 1)

Appendix C.4 – Photos

Photo 1 – Update on stable slope face by Camp Lake Tributary #1 on August 1, 2016.

Appendix C.5 – Photos at various locations along the Tote Road


Photo 1 – Water flowing downstream of CV223 on July 31, 2016


Photo 2 – Downstream of CV078 flowing clear on July 31, 2016


Photo 3 – Clear flow downstream of BG-17 on July 31, 2016


Photo 4 – Outlet of BG-28 flowing clear on July 31, 2016

Photo 5 – BG-29 flowing clear downstream on July 31, 2016

Photo 6 – BG -31 flowing clear downstream of culvert on July 31, 2016

Appendix C.6 – Photos Not Required (No Change from Report Update No. 2)

Baffinland

Report on Actions Taken:

June 7th 2016, Fisheries Act Direction (File number: 4408-2016-05-10-001) and

Response to June 16, 2016, INAC Letter of Non-Compliance

Bi-Weekly Report No. 4 for Period August 6 to August 19, 2016

August 19, 2016

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Spill Report 16-202 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Spill Report 16-202 – Update 1 - Milne Inlet Tote Road, Tributaries to Muriel Lake (BG-31) and David Lake (BG-28)

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C.7 - Removal of Impacted Snow: Milne Beach and Tote Road Bridges

Report Basis

The document provided, herein, is the fourth bi-weekly progress report as required under the June 7 Fisheries Direction provided by Environment Canada (page 6, Measures to be Taken, Item 1) and reports on the period August 6 through August 19. Specifically, the bi-weekly reports are to provide updates on the actions taken to address sedimentation issues and ongoing actions being taken at the site to address Items 2 and 3 as outlined in the Fisheries Direction. Previous actions, including pre-freshet actions, were reported on in the June 24th, 2016, Report on Actions Taken and subsequent Bi-Weekly Reports Nos. 1 to 3, incl.

1. Unauthorized Releases and Contributing Factors

A number of unauthorized releases of sediment were reported to Environment Canada (EC), Indigenous and Northern Affairs Canada (INAC), and the NT-NU Spill Line during the months of May and June. These included the Spill Report numbers 16-158, 16-176, 16-181, 16-198, 116-202, and 116-202 Update No. 1. Copies of the original Spill Reports are provided in Appendix A. During the current reporting period, there were no further unauthorized sediment releases reported.

As of August 19, the potentially affected drainages continue to run, for the most part, visually clear of sediment. There were moderate rainfall events during the reporting period which resulted is some minor turbidity in Camp Lake Tributary and tributaries discharging to Mary River, especially during the first week of August. Monitoring results for early August are included in this report.

2. Retention of Third Party Expertise

When sediment release events were first observed and reported, third party expertise was retained and these individuals were brought to site. A list of those individuals and support provided was detailed in the June 24th, 2016, Report on Actions Taken. We continue discussions with those various individuals to provide advice as warranted. During the reporting period, the following consultants/contractors provided assistance:

- In early August, Golder was selected as the key consultant to support Baffinland in the development of the Dust Mitigation Action Plan and the Tote Road and Mine Haul Road Mitigation Action Plans.
- During the period August 12 to 16, drainage and dust specialists visited the site to conduct an assessment of site conditions and to consult with on-site managers regarding the development and implementation of the proposed action plans.
- A water treatment specialist from AMEC Foster Wheeler was on site during the first week of August to assist with polymer treatment testing in the field.

3. Water Quality and Acute Toxicity Sampling Results for Areas of Concern

Spill Reports for sediment releases are provided in Appendix A. Potential receivers for the sediment releases included Sheardown Lake, Sheardown Lake Tributary, Camp Lake, Camp Lake Tributaries, Mary River and Mary River Tributaries, David Lake and David Lake Tributaries, Muriel Lake and Muriel Lake Tributaries.

Available water quality and acute toxicity results for Sheardown Lake, Camp Lake, and Mary River systems are provided in Appendix B. These results include data provided in the previous reports covering the period up to August 5, 2016, as well as new results that became available during the current reporting period. GPS coordinates and maps are provided to show approximate sample locations as well as the location of structures that were installed to mitigate the sediment concerns.

Water quality results have been compared to the Effluent Quality Discharge Limits for Contact Water (Table 11) provided in the Type "A" Water Licence No. 2AM-MRY1325 for the Mary River Project, which are summarized in the table below:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	15	30
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Note that in areas where there is or has been active construction, the following effluent discharge limits apply:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	50	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

During the current August 6 to 19 reporting period, there were no exceedances of the Type A Water Licence criteria.

Due to the acceptable water quality results over the reporting period for the areas of concern, further acute toxicity analyses was not performed. Previous acute toxicity analyses have shown non-lethal results from the discharge water samples that were collected and reported previously.

Water sampling will continue on a periodic basis, and additional data, including laboratory results that are in progress for this reporting period, will be included in future bi-weekly update reports.

4. Corrective Measures for Reported Spills and Other Concerns

4.1. Immediate actions undertaken to address issues

A number of immediate actions were undertaken to address sediment releases to water bodies that were documented in the Spill Reports submitted to authorities. These actions were presented previously in previous Reports on Actions Taken.

In the case of the Milne Ore Pad and the Mine Site Ore Pad drainage and collection systems, construction of ditch systems were completed by June 15 and July 15, respectively. As of those dates, the ditching systems were functional and currently performance is under observation and evaluation. Construction Summary Reports (CSRs) for the facilities are currently in preparation and will be submitted to the Nunavut Water Board within three months after the substantial completion of construction.

4.2. Detailed work completed by area of concern

Any new work actions taken during the August 6 to August 19 reporting period for the areas of concern are provided in Appendix C. Actions, if taken, are appended to the overall action list provided in the previous work action lists. In addition, new photos for the current reporting period are provided as warranted. Appendix C is subdivided as follows:

Appendix C.1: Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake.
Appendix C.2: Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.

Appendix C.3: Spill Report 16-181- Mine Haul Road to Mary River and Sheardown Lake Tributary.
Appendix C.4: Spill Report 16-198 - Camp Lake Tributary 1
Appendix C.5: Spill Report 16-202 and Update No. 1 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Appendix C.6: Milne Port Ore Stockpile Drainage Collection System.
Appendix C.7: Milne Port Beach
Appendix C.8: Sediment on and under bridges along Tote Road.

5. Next Steps

5.1. Bi-weekly update reports

Bi-weekly update reports will continue to be provided including any additional construction work completed and additional water sampling data. The next report will cover the period from August 20 to September 2, 2016.

5.2. Completed construction repairs

Construction repairs for the areas of concern including the Milne Port Ore Stockpile Drainage system and the Mine Site Crusher Stockpile Pad have been substantially completed by the established July 17, 2016, deadline.

5.3. Lessons-learned

Baffinland will conduct an extensive review and analyses of lessons- learned with regard to sedimentation issues along the roads and at the camps. Key conclusions and recommendations will be provided in the Completion Report which will be provided to regulators and inspectors. Baffinland will be open to any comments and recommendations received and will make revisions as is appropriate.

5.4. Long-term action plans

Longer term action plans related to dust mitigation and Tote Road work as related to drainage considerations are underway and will be provided by September 30, 2016.

5.5. Completion Report

A completion report that summarizes the results of all work to date and is signed off by the CEO of the company will be provided by September 30, 2016.

Appendix A

NT-NU Spill Reports

(Refer to Report No. 1)

Appendix B

Surface Water Quality and Acute Toxicity Results for Affected Areas

(Refer to Biweekly Report No. 6)

Appendix C

Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

(Refer to Biweekly Report No. 6 for Complete List of Actions Taken)

Appendix C.1 - Photos

Photo 1 – Outlet at Sheardown Lake Tributary on August 10, 2016

Photo 2 – Upstream at Sheardown Lake Tributary on August 10, 2016

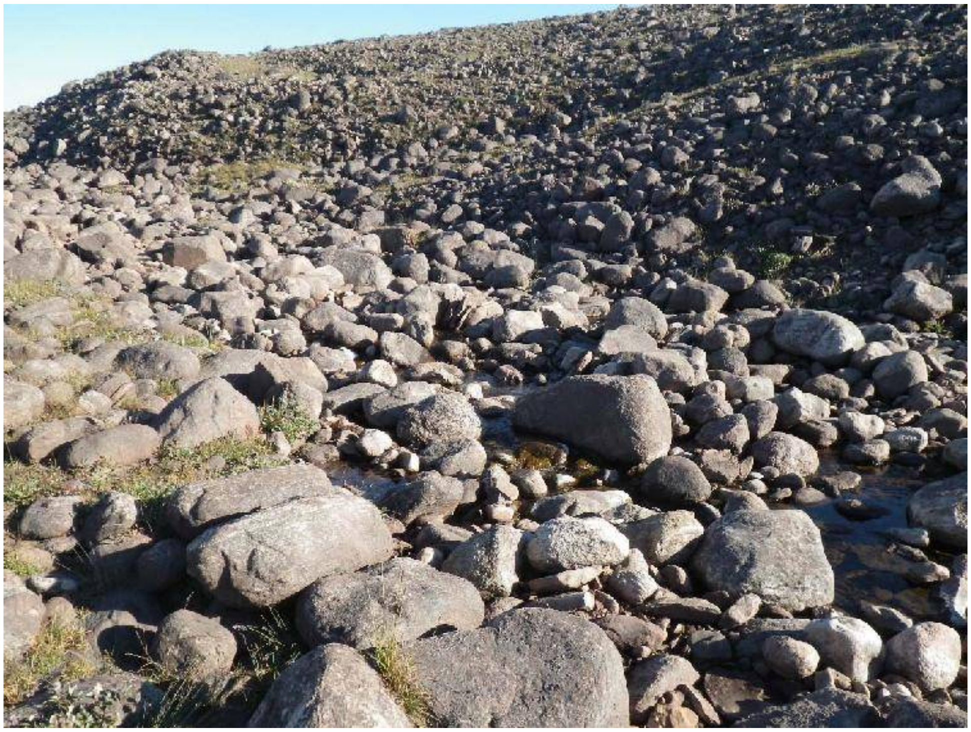

Photo 4 – Outlet at Landfill Gate Tributary on August 10, 2016

Appendix C.2 – Photos

Photo 1 – Camp Lake Tributary #1 on August 10, 2016 (looking upstream)

Appendix C.3 – Photos

Photo 1 – Mary River at Sample Location EO-21 view upstream August 18, 2016.

Photo 2 – Mary River at Sample Location EO-21 view downstream August 18, 2016.

Appendix C.4 – Photos

Photo 1 – Current status of stable slope face by Camp Lake Tributary #1 on August 16, 2016.

Baffinland

Report on Actions Taken:

June 7th 2016, Fisheries Act Direction (File number: 4408-2016-05-10-001) and Response to June 16, 2016, INAC Letter of Non-Compliance Bi-Weekly Report No. 5 for Period August 20 to September 2, 2016

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Report Basis

The document provided, herein, is the fifth bi-weekly progress report as required under the June 7 Fisheries Direction provided by Environment Canada (page 6, Measures to be Taken, Item 1) and reports on the period August 20th through September 2nd. Specifically, the bi-weekly reports are to provide updates on the actions taken to address sedimentation issues and ongoing actions being taken at the site to address Items 2 and 3 as outlined in the Fisheries Direction. Previous actions, including pre-freshet actions, were reported on in the June 24th, 2016, Report on Actions Taken and subsequent Bi-Weekly Reports Nos. 1 to 4, incl.

1. Unauthorized Releases and Contributing Factors

A number of unauthorized releases of sediment were reported to Environment Canada (EC), Indigenous and Northern Affairs Canada (INAC), and the NT-NU Spill Line during the months of May and June. These included the Spill Report numbers 16-158, 16-176, 16-181, 16-198, 116-202, and 116-202 Update No. 1. Copies of the original Spill Reports are provided in Appendix A. During the current reporting period, there were no further unauthorized sediment releases reported.

As of September 2nd, the potentially affected drainages continue to run, for the most part, visually clear of sediment. There were natural slope sloughing events upstream of the project development area and downstream of Deposit 1 on the MMER tributary during the reporting period which resulted in intermittent increased sediment loading in Mary River. Minor Rain events also contributed to sediment loading during this reporting period in Mary River. Monitoring results for late August are included in this report.

Retention of Third Party Expertise

When sediment release events were first observed and reported, third party expertise was retained and these individuals were brought to site. A list of those individuals and support provided was detailed in the June 24th, 2016, Report on Actions Taken. We continue discussions with those various individuals to provide advice as warranted. During the reporting period, the following consultants/contractors provided assistance:

- In early August, Golder was selected as the key consultant to support Baffinland in the development of the Dust Mitigation Action Plan and the Tote Road and Mine Haul Road Mitigation Action Plans. Action and mitigation plans continued to be developed during this reporting period.
- In late August, Nuna was contracted to complete select environmental work for Baffinland. This work included the maintenance and clearing of sediment from the ditching system and sumps before culverts on the Mine Haul road. This work is currently ongoing.

2. Water Quality and Acute Toxicity Sampling Results for Areas of Concern

Spill Reports for sediment releases are provided in Appendix A. Potential receivers for the sediment releases included Sheardown Lake, Sheardown Lake Tributary, Camp Lake, Camp Lake Tributaries, Mary River and Mary River Tributaries, David Lake and David Lake Tributaries, Muriel Lake and Muriel Lake Tributaries.

Available water quality and acute toxicity results for Sheardown Lake, Camp Lake, and Mary River systems are provided in Appendix B. These results include data provided in the previous reports covering the period up to August 30th, 2016, as well as new results that became available during the current reporting period. GPS coordinates and maps are provided to show approximate sample locations as well as the location of structures that were installed to mitigate the sediment concerns.

Water quality results have been compared to the Effluent Quality Discharge Limits for Contact Water (Table 11) provided in the Type "A" Water Licence No. 2AM-MRY1325 for the Mary River Project, which are summarized in the table below:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	15	30
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Note that in areas where there is or has been active construction, the following effluent discharge limits apply:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	50	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

During the current August 20^{th} to September 2^{nd} reporting period, there were a number of water samples on Mary River that exceeded the Maximum Average Concentration of our Type A Water licence on Mary River. An investigation of the source of the sediment indicated that slope sloughing up stream of the project development area primarily contributed to this sediment loading, however low volumes of turbid water from the MMER tributary contributed intermittently to the increased sediment loading in Mary River. Freeze, thaw conditions and minor rain events predominantly caused the sloughing observed.

The Mary River sloughing was approximately 10km upstream of the project development area. Additional sampling was completed at G0-03 to evaluate sediment loading upstream of mine related effects.

The sloughing present above the low flow MMER tributary is approximately 1km upstream of F0-01. Silt fencing was installed on August 27 to reduce the levels of sediment being discharged at F0-01.

Due to the historically non-lethal water quality results over the reporting period for the areas of concern, further acute toxicity analyses was not performed. Previous acute toxicity analyses have shown non-lethal results from the discharge water samples that were collected and reported previously.

Water sampling will continue on a periodic basis, and additional data, including laboratory results that are in progress for this reporting period, will be included in future bi-weekly update reports. To monitor the increased sediment loading in Mary River, primarily resultant from the slope sloughing above the project development area, increased monitoring was performed during this reporting period.

3. Corrective Measures for Reported Spills and Other Concerns

3.1. Immediate actions undertaken to address issues

A number of immediate actions were undertaken to address sediment releases to water bodies that were documented in the Spill Reports submitted to authorities. These actions were presented in previous Reports on Actions Taken.

In the case of the Milne Ore Pad and the Mine Site Ore Pad drainage and collection systems, construction of ditch systems were completed by June 15 and July 15, respectively. As of those dates, the ditching systems were functional and currently performance is under observation and evaluation. Construction

Summary Reports (CSRs) for the facilities are currently in preparation and will be submitted to the Nunavut Water Board within three months after the substantial completion of construction.

3.2. Detailed work completed by area of concern

Any new work actions taken during the August 20 to September 2 reporting period for the areas of concern are provided in Appendix C. Actions taken are appended to the overall action list provided in the previous work action lists. In addition, new photos for the current reporting period are provided as warranted. Appendix C is subdivided as follows:

Appendix C.1: Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake.
Appendix C.2: Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.
Appendix C.3: Spill Report 16-181- Mine Haul Road to Mary River and Sheardown Lake Tributary.
Appendix C.4: Spill Report 16-198 - Camp Lake Tributary 1
Appendix C.5: Spill Report 16-202 and Update No. 1 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Appendix C.6: Milne Port Ore Stockpile Drainage Collection System.
Appendix C.7: Milne Port Beach
Appendix C.8: Sediment on and under bridges along Tote Road.

4. Next Steps

4.1. Bi-weekly update reports

Bi-weekly update reports will continue to be provided including any additional construction work completed and additional water sampling data. The next report will cover the period from September 2nd to September 16th, 2016.

4.2. Completed construction repairs

Construction repairs for the areas of concern including the Milne Port Ore Stockpile Drainage system and the Mine Site Crusher Stockpile Pad have been substantially completed by the established July 17, 2016, deadline.

4.3. Lessons-learned

Baffinland will conduct an extensive review and analyses of lessons- learned with regard to sedimentation issues along the roads and at the camps. Key conclusions and recommendations will be provided in the Completion Report which will be provided to regulators and inspectors. Baffinland will be open to any comments and recommendations received and will make revisions as is appropriate.

4.4. Long-term action plans

Longer term action plans related to dust mitigation and Tote Road work as related to drainage considerations are underway and will be provided by September 30, 2016.

4.5. Completion Report

A completion report that summarizes the results of all work to date and is signed off by the CEO of the company will be provided by September 30, 2016.

Appendix A

NT-NU Spill Reports

(Refer to Report No. 1)

Appendix B

Surface Water Quality and Acute Toxicity Results for Affected Areas

(Refer to Biweekly Report No. 6)

Appendix C

Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

(Refer to Biweekly Report No. 6 for Complete List of Actions Taken)

Appendix C.1 - Photos

Photo 1 – Outlet at Sheardown Lake Tributary on August 29, 2016

Photo 2 – Upstream at Sheardown Lake Tributary on August 29, 2016

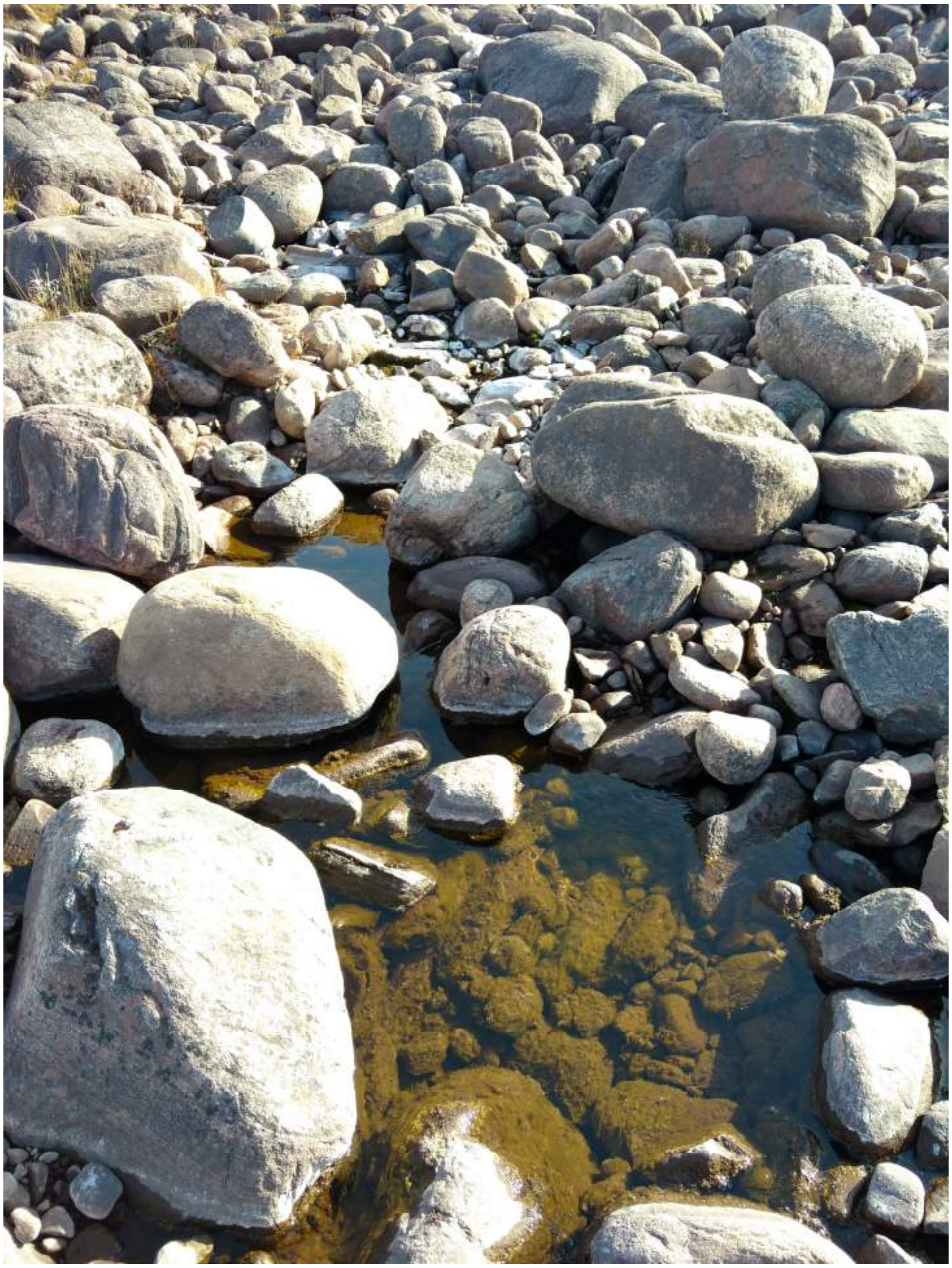

Photo 3 – Flow at Landfill Gate Tributary on August 29, 2016

Appendix C.2 – Photos

Photo 1 – Outlet at Camp Lake Tributary on August 29, 2016

Photo 2 – Upstream at Camp Lake Tributary on August 29, 2016

Appendix C.3 – Photos

Photo 1 – Mary River upstream of Mine site during natural sediment loading event on August 28, 2016

Photo 2 – Waterfall upstream of Mine site during natural sediment loading event on August 29, 2016

Photo 3 – Mary River downstream of Mine site during natural sediment loading event on August 28

Photo 4 – Thaw slope sloughing occurring upstream of project development area on August 30, 2016

Photo 4 – Tributary downstream of thaw slope sloughing joining Mary River upstream of the project development area on August 30, 2016

Photo 5 – Slope sloughing on MMER tributary upstream of Mary River with silt fence mitigation measures installed on August 26, 2016

Appendix C.4 – Photos

Photo 1 – Current status of stable slope face by Camp Lake Tributary #1 on August 30, 2016.

Appendix C.5 – Photos at various locations along the Tote Road

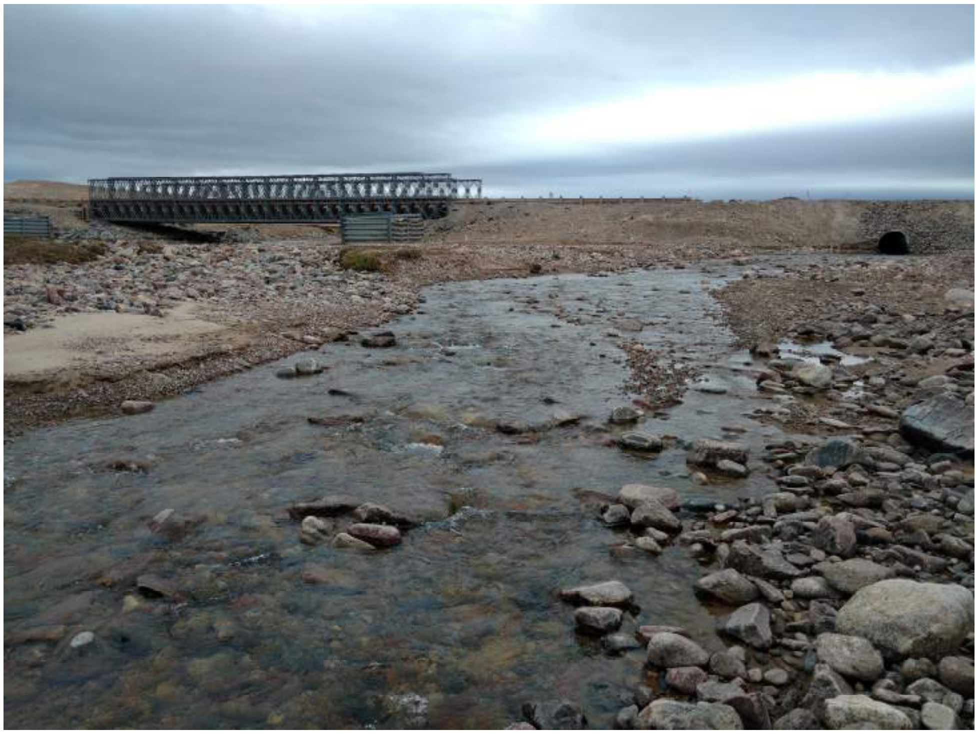

Photo 1 – Water flowing clear downstream of CV223 (km 97) on August 26, 2016

Photo 2 – Water flowing clear downstream of BG-17 (km 90) on August 26, 2016

Photo 3 – Water flowing clear downstream of BG-28 (km 86.3) on August 26, 2016

Photo 4 – Water flowing clear downstream of BG-29 (km 85) on August 26, 2016

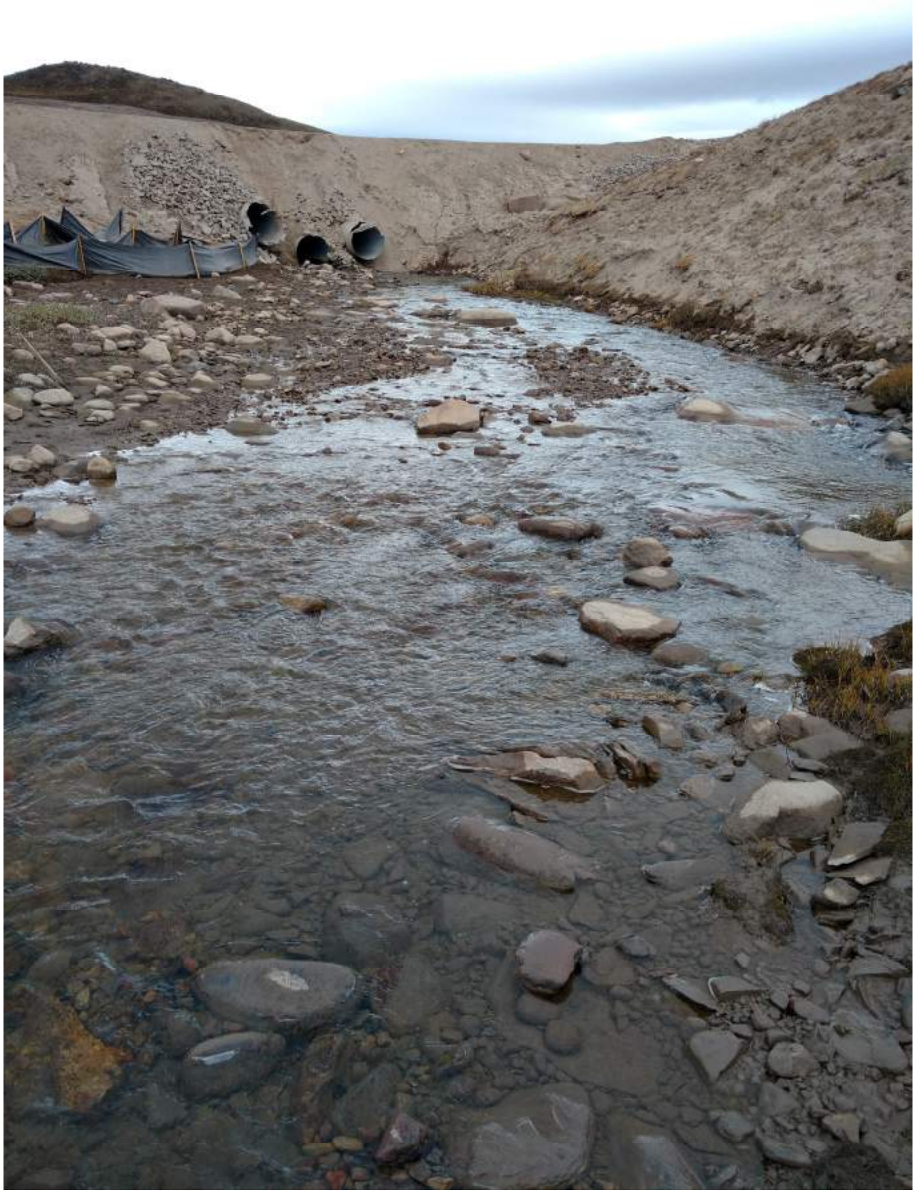

Photo 5 – Water flowing clear downstream of BG-01 (km 100) on August 26, 2016

Report on Actions Taken:

June 7th 2016, Fisheries Act Direction (File number: 4408-2016-05-10-001) and

Response to June 16, 2016, INAC Letter of Non-Compliance

Bi-Weekly Report No. 6 for Period September 2 to September 16, 2016

September 16, 2016

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B.2 - Water Quality and Results
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Appendix C - Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

C.1 - Spill Report 16-158
C.2 – Spill Report 16-176
C.3 – Spill Report 16 - 181
C.4 – Spill Report 16 - 198
C.5 – Spill Report 16 -202
C.6 – Milne and Mine Site Drainage Works
C.7 – Removal of Impacted Snow: Milne Beach and Tote Road Bridges

Report Basis

The document provided, herein, is the sixth bi-weekly progress report as required under the June 7 Fisheries Direction provided by Environment Canada (page 6, Measures to be Taken, Item 1) and reports on the period September 2nd through September 16th. Specifically, the bi-weekly reports are to provide updates on the actions taken to address sedimentation issues and ongoing actions being taken at the site to address Items 2 and 3 as outlined in the Fisheries Direction. Previous actions, including pre-freshet actions, were reported on in the June 24th, 2016, Report on Actions Taken and subsequent Bi-Weekly Reports Nos. 1 to 5, incl.

1. Unauthorized Releases and Contributing Factors

A number of unauthorized releases of sediment were reported to Environment Canada (EC), Indigenous and Northern Affairs Canada (INAC), and the NT-NU Spill Line during the months of May and June. These included the Spill Report numbers 16-158, 16-176, 16-181, 16-198, 116-202, and 116-202 Update No. 1. Copies of the original Spill Reports are provided in Appendix A. During the current reporting period, there were no further unauthorized sediment releases reported.

During the reporting period, the monitored streams and tributaries continued to run visually clear of sediment. Near the end of this reporting period, sub-zero temperatures have resulted in the freeze up of many of the monitored streams.

Retention of Third Party Expertise

When sediment release events were first observed and reported, third party expertise was retained and these individuals were brought to site. A list of those individuals and support provided was detailed in the June 24th, 2016, Report on Actions Taken. We continue discussions with those various individuals to provide advice as warranted. During the reporting period, the following consultants/contractors provided assistance:

- In early August, Golder was selected as the key consultant to support Baffinland in the development of the Dust Mitigation Action Plan and the Tote Road and Mine Haul Road Mitigation Action Plans. Action and mitigation plans continued to be developed during this reporting period.
- In late August and early September, Nuna Logistics was contracted to complete select environmental work for Baffinland. This work included the maintenance and clearing of sediment from the ditching system and sumps upstream of culverts and check dams adjacent to the Mine Haul road. The planned work was completed.

2. Water Quality and Acute Toxicity Sampling Results for Areas of Concern

Spill Reports for sediment releases are provided in Appendix A. Potential receivers for the sediment releases included Sheardown Lake, Sheardown Lake Tributary, Camp Lake, Camp Lake Tributaries, Mary River and Mary River Tributaries, David Lake and David Lake Tributaries, Muriel Lake and Muriel Lake Tributaries.

Available water quality and acute toxicity results for Sheardown Lake, Camp Lake, and Mary River systems are provided in Appendix B. These results include data provided in the previous reports covering the period up to September 5th, 2016, as well as new results that became available during the current reporting period. GPS coordinates and maps are provided to show approximate sample locations as well as the location of structures that were installed to mitigate the sediment concerns.

Water quality results have been compared to the Effluent Quality Discharge Limits for Contact Water (Table 11) provided in the Type "A" Water Licence No. 2AM-MRY1325 for the Mary River Project, which are summarized in the table below:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	15	30
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Note that in areas where there is or has been active construction, the following effluent discharge limits apply:

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	50	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

During the current September 2nd to September 16th reporting period, low flows at LDFG-OUT resulted in sediment being stirred up during sampling on September 5th, resulting in a TSS of 22 mg/L. Continued low flows and freeze-up shortly after prevented the resampling of LDFG-OUT. Similarly, low flows, winter storms and freeze-up prevented the collection of water samples at the monitored streams (culverts) along the Tote Road. Due to decreasing sub-zero temperatures and freeze up, periodic water quality monitoring has been discontinued for the year.

All other monitored locations showed no exceedances to the Water Licence criteria listed above during the reporting period.

Due to the historically non-lethal water quality results over the reporting period for the areas of concern, further acute toxicity analyses was not performed. Previous acute toxicity analyses have shown non-lethal results from the discharge water samples that were collected and reported previously.

3. Corrective Measures for Reported Spills and Other Concerns

3.1. Immediate actions undertaken to address issues

A number of immediate actions were undertaken to address sediment releases to water bodies that were documented in the Spill Reports submitted to authorities. These actions were presented in previous Reports on Actions Taken.

In the case of the Milne Ore Pad and the Mine Site Ore Pad drainage and collection systems, construction of ditch systems were completed by June 15 and July 15, respectively. As of those dates, the ditching systems were functional and currently performance is under observation and evaluation. Construction Summary Reports (CSRs) for the facilities are currently in preparation and will be submitted to the Nunavut Water Board within three months after the substantial completion of construction.

3.2. Detailed work completed by area of concern

Any new work actions taken during the September 2nd – 16th reporting period for the areas of concern are provided in Appendix C. Actions taken are appended to the overall action list provided in the previous work action lists. In addition, new photos for the current reporting period are provided as warranted. Appendix C is subdivided as follows:

Appendix C.1: Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake.
Appendix C.2: Spill Report 16-176 - Camp Lake Tributaries and Camp Lake.
Appendix C.3: Spill Report 16-181- Mine Haul Road to Mary River and Sheardown Lake Tributary.
Appendix C.4: Spill Report 16-198 - Camp Lake Tributary 1
Appendix C.5: Spill Report 16-202 and Update No. 1 - Milne Inlet Tote Road, Tributaries to Mary Lake, David Lake, and Muriel Lake.
Appendix C.6: Milne Port Ore Stockpile Drainage Collection System.
Appendix C.7: Impacted Snow Removal from Milne Beach and Tote Road Bridges

4. Next Steps

4.1. Bi-weekly update reports

This will be the last biweekly update report (No. 6) before the completion report is submitted by September 30, 2016.

4.2. Completed construction repairs

Construction repairs for the areas of concern including the Milne Port Ore Stockpile Drainage system and the Mine Site Crusher Stockpile Pad have been substantially completed by the established July 17, 2016, deadline.

4.3. Lessons-learned

Baffinland will conduct an extensive review and analyses of lessons- learned with regard to sedimentation issues along the roads and at the camps. Key conclusions and recommendations will be provided in the Completion Report which will be provided to regulators and inspectors. Baffinland will be open to any comments and recommendations received and will make revisions as is appropriate.

4.4. Long-term action plans

Longer term action plans related to dust mitigation and Tote Road work as related to drainage considerations are underway and will be provided by September 30, 2016.

4.5. Completion Report

A completion report that summarizes the results of all work to date and is signed off by the CEO of the company will be provided by September 30, 2016.

Appendix A

NT-NU Spill Reports

(Refer to Report No. 1)

Appendix B

Surface Water Quality and Acute Toxicity Results for Affected Areas

(Refer to Biweekly Report No. 6)

Appendix C

Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

(Refer to Biweekly Report No. 6 for Complete List of Actions Taken)

Appendix C.1 - Photos

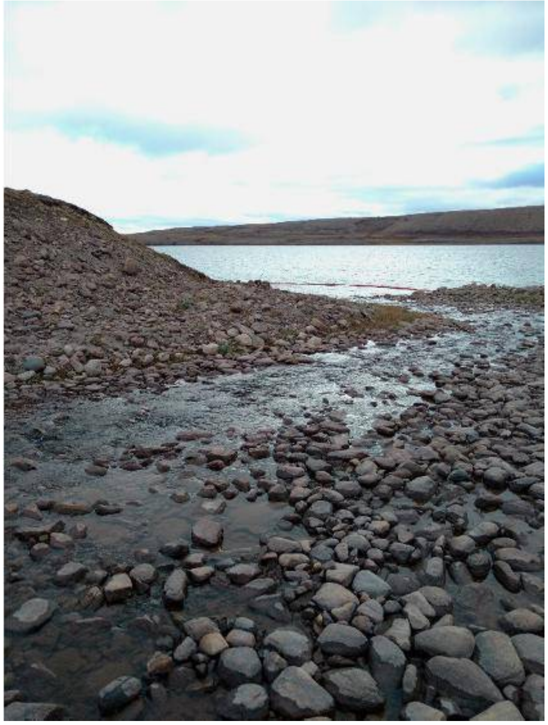

Photo 1 – Outlet at Sheardown Lake Tributary on September 5, 2016

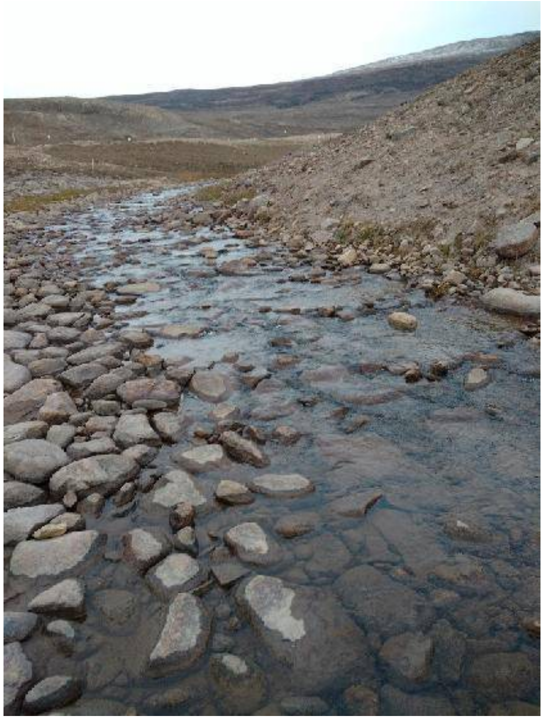

Photo 2 – Upstream of the outlet of Sheardown Lake Tributary on September 5, 2016

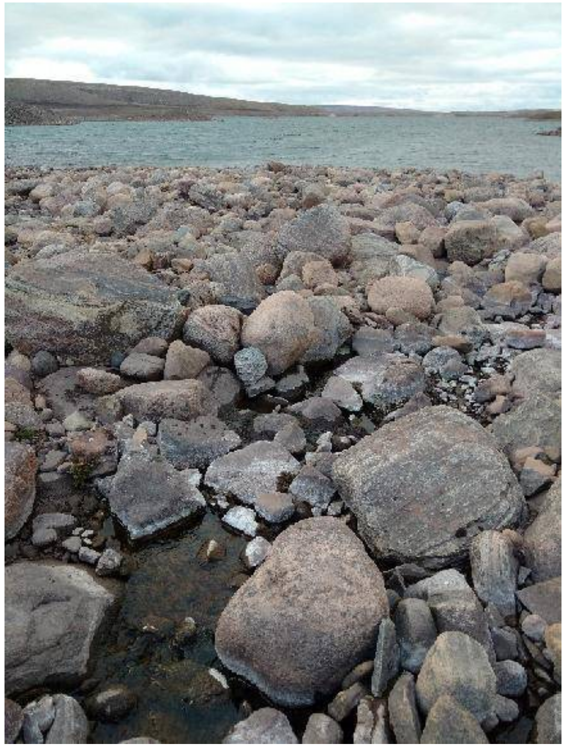

Photo 3 – Outlet at Landfill Gate Tributary on September 5, 2016

Appendix C.2 – Photos

Photo 1 – Outlet of Camp Lake Tributary on September 5, 2016

Photo 2 – Upstream of Camp Lake Tributary outlet on September 5, 2016

Appendix C.3 – Photos

Photo 1 – Upstream of C0-05 on the Mary River on September 5, 2016

Photo 2 – Upstream of G0-03 on the Mary River on September 5, 2016

Appendix C.4 – Photos Not Required (No Change from Report Update No. 5)

Appendix C.5 – Photos at various locations along the Tote Road

Photo 1 – Freeze up downstream of CV-223 (km 97) on September 12, 2016

Photo 2 – Frozen stream downstream of BG-28 (km 86.3) on September 12, 2016

Photo 3 – Frozen stream downstream of BG-31 (km 82) on September 12, 2016

COMPLETION REPORT (ABBREVIATED)

Completion Report:

Environment and Climate Change Canada Fisheries Act Direction (File: 4408-2016-05-10-001) and

INAC Letter of Non-Compliance

(NWB Licence 2AM-MRY1325)

September 2016

DATE	REV	STATUS	PREPARED BY	APPROVED BY
29 Sept 2016	0	Issued For Use	Wayne McPhee	Brian Penney

This Completion Report has been prepared by Baffinland Iron Mines Corporation (Baffinland) to respond to the *Fisheries Act* Direction (FAD) received from Environment and Climate Change Canada (ECCC) and the Letter of Non-Compliance (LNC) received from Indigenous and Northern Affairs Canada (INAC) on June 7, 2017 and June 16, 2017, respectively. The FAD and LNC were based on inspections made of the Mary River Project Site by ECCC and INAC Enforcement and Water Resource Officers during the period May 18 to 20, 2016. Specifically, this report complies with a requirement in those documents for a submission of a Completion Report by September 30, 2016.

Unauthorized Sediment Releases

Freshet in 2016 was characterized by high flows in the tributaries and streams due to a thick snow pack, large snow drifts from blowing snow and an early start to Freshet. During the early stages of freshet, there were a number of instances where water samples exceeded the Discharge Criteria for Total Suspended Solids (TSS) but as the incident response measures were implemented, the majority of the discharge samples met the discharge criteria. In addition, all samples collected for Acute Toxicity analysis have shown non-lethal results from the discharge.

Unauthorized releases of sediment were reported by Baffinland to ECCC, INAC, and the NT-NU Spill Line during the months of May and June 2016. These included the Spill Report numbers 16-158, 16-176, 16-181, 16-198, 116-202, and 116-202 Update No. 1.

ECCC Fisheries Act Direction (FAD) and INAC Letter of Non-Compliance (LNC)

The FAD and LNC documents specified measures to be taken by Baffinland to reduce the risk of ongoing and future sedimentation and to also take action to improve current conditions (e.g., completion of some construction ditching projects).

ECCC FAD Measures to be taken

"Immediately take all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat to prevent the above mentioned occurrence or to counteract, mitigate, or remedy, any adverse effects that result from the above mentioned occurrence or might reasonably be expected to result from it, including:

a. Provide by June 24, 2016, a report on the actions taken to address sedimentation issues at the BIM, Mary River Project following the ECCC on-site inspection of May 18-20, 2016 and provide Bi-weekly updates (once every two weeks) of ongoing actions being taken at the site including actions to address issues mentioned in measures to be taken 2 & 3.

b. Provide by September 30, 2016 a dust mitigation action plan with an implementation schedule addressing crushing operations, wind coming in contact with the crushed rock/iron stock piles, and vehicle traffic on the Tote Road.

c. Provide by September 30, 2016 a Tote Road and Mine Hall Road mitigation action plan with an implementation schedule addressing sediment water runoff from the road into culverts, ditches, and creeks/streams which leads to David Lake, Mural Lake, Kabikok Lake, KM 32 Lake and KM27 Lake, Camp Lake, Sheardown Lake, Mary River, and Phillips Creek.

d. *Finish constructing by July 17, 2016 the drainage ditching to the Milne Port Stockpile East Sedimentation Pond (MP05) to allow contact water with the iron ore stockpiles to divert into the Milne Port Stockpile East Sedimentation Pond (MP05) to prevent the contact water from entering Milne Inlet, Arctic Ocean.*

e. *Finish constructing by July 17, 2016 the drainage ditching to the Mary Rive Mine Site Iron Ore Stockpile crusher sediment pond (MS06) to allow contact water with the iron ore stockpiles and crusher area to divert into this Sedimentation Pond (MS06) to prevent the contact water from entering Sheardown Lake.*

A report on the completion of these measures signed by Mr. Brian Penney must be submitted in writing to the undersigned Inspector on or before September 30, 2016."

INAC LNC Measures to be taken

a. Implement a plan to address "*the Ore Stockpile Diversion Ditches at Milne Inlet with a completion date by July 17, 2016*". (Based on May 23, 2016, Plan submitted to INAC)

b. Produce an "*Action Plan to address the sedimentation of watercourses along the Tote Road. This plan shall be submitted to the INAC Inspector by June 24, 2016 and will include a schedule of work to be done in 2016 on the Tote Road to specifically deal with the sedimentation of watercourses.*"

c. Requirement for Baffinland to take reasonable diligence towards meeting the requirement of their licence, Part D Item 4, namely "*The Licensee shall implement sediment and erosion control measures, as required, prior to ensuring all phases of the Mary River Project to prevent and/or minimize sediment loading into water.*"

Preventative and Corrective Actions

Baffinland had undertaken significant measures prior to the May 2016 inspections to prepare for the onset of freshet including but not limited to:

- A major program of culvert replacement and riprap installation was completed on the Mine Haul Road between April 15 and May 15, 2016. The work involved the installation of 525 m of new culverts and the installation of 4,400 m3 of rip rap in 3.5 km of ditches and on surface slopes located upstream and downstream of seven culvert crossings. The as built report for this work is presented in Appendix A.1.
- Clearing of snow from the road surface, embankment, and from areas adjacent to the road to minimize the impact of runoff from road contact water to downstream water bodies.
- Early excavation and clearing of snow from the inlets and outlets of the stream crossings and clearing of culverts with steamers to ensure water flow.
- The installation of silt fences and check dams at selected locations.

Immediate response to the early onset of freshet to address sediment releases to water bodies included:

- Additional silt fence and silt curtain installation.
- Check dam construction and operation to allow settling of solids from the water column.
- Construction of temporary settling ponds near the Camp Lake Jetty.
- Redirection of sediment / turbid waters away from fish habitat using ditches, swales, and pumping.
- Removal of sediment accumulated at culvert crossings at various locations.
- Removal of dirty snow and ice from under Tote Road bridges and from the north end of the Ore Stockpile Area along the beach at Milne Port.

Over the summer months other preventative actions were undertaken including:

- Additional check dam construction (a total of eight).
- Placement of geotextile and riprapping of ditches along the Tote Road and along the upper sections of the Mine Haul Road.
- Targeted road resurfacing with granular material the Tote Road and Mine Haul Road.
- Berm construction along the Tote Road and Mine Haul Road to limit migration of material mobilized due to permafrost degradation.
- Excavation of ditches around the Crusher Stockpile and Ore Stockpile pads to help direct drainage to the established settling ponds.

A comprehensive record of immediate and near term actions undertaken to address sediment releases was provided in update reports to ECCC and INAC including the June 24, 2016 Report on Actions Taken and the six additional Biweekly Progress Reports.

The Ore Milne Ore Stockpile ditching was completed by Baffinland as soon as ground temperatures permitted excavation. A construction plan was submitted to INAC and ECCC inspectors in late May with ditch construction commencing within one week of the May 18 to 20 Regulatory Inspection. The ditching system was substantially completed by mid-June. The as-built drawings for the facility are presented in Attachment A.2.

The ditching system for the Crusher Stockpile area was partially completed in 2015 to allow for drainage from much of the stockpile area to the settling pond. During late June and early July, additional ditching was constructed to fully address drainage from the stockpile area. The as-built drawing for the ditching system constructed this past summer is presented in Attachment A.3.

Dust and Sedimentation Mitigation Action Plans

In response to ECCC direction, comprehensive Dust Mitigation and Sedimentation Action Plans were developed as separate deliverables consistent with the FAD and LNC requirements. These plans are closely related to each other and are synergistic when they are implemented together. Plan development included review of existing information, a site visit by technical specialists in mid-August, interviews with key managers and superintendents on site, and a series of several follow-up meetings and discussions with key representatives of Site Operations.

Dust Mitigation Action Plan

The Dust Mitigation Action Plan (Attachment B) outlines detailed recommended actions including responsible party and schedule for completion for the affected areas of the Project Site. Baffinland commits to completing the recommended actions to address dust management at the Mary River site.

Sedimentation Mitigation Action Plan

The Sedimentation Action Plan (Attachment C) outlines actions including responsible party and schedule for completion for the affected areas of the Project Site. Baffinland commits to completing the recommended actions to address sediment mitigation at the Mary River site.

Lessons Learned

Baffinland has conducted a review and analyses of lessons-learned with regard to sedimentation issues along the roads and at the camps. Key conclusions and recommendations have been provided as part of the Dust and Sediment Mitigation Action Plan reports.

Closure

With the submission of this Completion Report, the report on actions taken to address sedimentation issues (June 24, 2016), Bi-weekly reports, Dust Mitigation Action Plan (Sept 30, 2016), Sedimentation Mitigation Action Plan (Sept 30, 2016), and the completion of construction of drainage structures at Milne Stock pile (Sept 27, 2016), and Mary River Site Iron Ore Stockpile (Sept 30, 2016), Baffinland has complied with the requirements of the ECCC *Fisheries Act* Direction and INAC Letter of Non-Compliance.

Attachments:

Attachment A: As Built Drawings
- A.1: Mine Haul Road Drainage Improvement Project Phase 1 Construction As-Built Report (abbreviated)
- A.2: Milne Ore Stockpile Ditches
- A.3: Crusher Stockpile Ditches

Attachment B: Dust Mitigation Action Plan
Attachment C: Sedimentation Mitigation Action Plan

Attachment A

As Built Drawings

Attachment B

Dust Mitigation Action Plan

September 29, 2016

MARY RIVER PROJECT

Dust Mitigation Action Plan Rev. 1

Submitted to:
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

REPORT

Project Number: 1661774 (5000)

Distribution:

1 e-copy – Baffinland Iron Mines Corporation
1 e-copy – Golder Associates Ltd.

Golder Associates

Table of Contents

TABLES

1.0 INTRODUCTION

On May 10, 2016, Mr. James Millard, Baffinland Iron Mines (Baffinland) Environmental Manager provided an email report to Mr. Curtis Didham, an Inspector designated by the Minister of Fisheries and Oceans (EO Didham), that on May 7, 2010, a snowmelt event occurred at the Baffinland site that led to sediment-laden runoff flowing into Sheardown Lake. Further, on May 17, 2016, Mr. Allan Knight, Baffinland Environmental Superintendent reported to Northern District Spills Duty Officer, EO MacDonald that a snowmelt event resulted in runoff containing sediments was observed to be flowing into Camp Lake Tributary #1 and into Camp Lake. EO MacDonald forwarded the report to EO Didham. These events, singularly and collectively set in motion a process of sample collection, laboratory analysis, reporting and ultimately resulted in a Baffinland site visit and inspection by EO Didham, Indigenous and Northern Affairs Canada (INAC) Water Resource Officers Justin Hack and Jonathan Mesher and INAC Environmental Assessment Officer Jason Patchell on May 18th and 19th, 2016.

A number or outcomes resulted from the site visit and inspection of the Baffinland site including a *Fisheries Act Direction* (FAD) to remedy a number of the immediate issues and further to develop and implement two action plans including, and by September 30, 2016:

1) A Dust Mitigation Action Plan with an implementation schedule addressing crushing operations, wind coming in contact with the crushed rock/iron stockpiles and vehicle traffic on the Tote Road; and
2) A Tote Road and Mine Haul Road Mitigation Action Plan with an implementation schedule addressing sediment water runoff from the road in to culverts, ditches and creeks/streams which lead to David, Mural, Kabikok, KM 32, KM 27, Camp and Sheardown lakes and into the Mary River and Phillips Creek.

The action plans were developed to address the specific areas noted in the FAD and to also address other areas on the site where dust and sediment could become an issue in the future. The action plans have been developed as separate deliverables consistent with the direction, but it is important to recognize that they are closely related to each other and will be synergistic when they are implemented together. This document specifically addresses the *Dust Mitigation Action Plan*.

Baffinland retained Golder Associates Ltd. (Golder) to prepare both the Dust Mitigation Action Plan and the Sedimentation Action Plan. The preparation of these plans included a site visit by Messrs. Chris Madland, Senior Air Quality Scientist, and Paul Bedell, PEng, Senior Geotechnical Engineer, of Golder from August 12 to August 16, 2016, inclusive. Extensive discussions between Baffinland personnel and Golder were carried out to develop the plans.

The Reader is referred to the Study Limitations (Section 8.0), which follows the text and forms an integral part of this document.

2.0 TOTE ROAD

Dust generated from use of the Tote Road is one of the items identified in the FAD that requires attention. The Tote Road is currently being used in this early phase of the Baffinland project to transport crushed ore from the crusher site at the main mine complex to the Milne Port Site. The Tote Road is a 100 kilometre (km)-long gravel road that supports approximately 100 return haul truck trips per day.

2.1 What are the mechanisms for dust generation on the Tote Road?

There are three mechanisms involved in generating dust along the Tote Road. Each of these mechanisms could result in dust being transported from the road to the immediately adjacent land and potentially into nearby water bodies. The three different ways that dust generation has been observed include:

- Wheel Entrainment;
- Wind-blown Dust; and
- Losses from the Ore Haul Truck Boxes.

2.1.1 Wheel Entrainment

Wheel-entrained dust is the dust that is re-suspended into the air after the passage of a vehicle on the road surface. It is suspended due to direct mechanical contact with vehicle tires and the following turbulent air at the surface and in the wake of the vehicle further lofts the particles where they are subject to any ambient wind present. This type of dust is typically composed of relatively large particles (most particles >30 microns (µm)) that fall out of suspension within a short distance of the road, e.g., within approximately 100 metres of the road, most of the dust will be settled out of the air column. The calculated amount of dust that is suspended due to wheel entrainment on an unmitigated gravel road that is typically generated by vehicle passage is described in the United States Compendium of emission factors (AP-42) is affected considerably by two factors. The two factors include the silt content (particles nominally smaller than 75 µm) of the travel surface and the weight of the vehicle using the road. In general terms, the higher the silt content and the heavier the vehicle, the more dust generation should be expected.

During a Golder Associates (Golder) site reconnaissance and inspection visit completed in mid-August, a step in the development of this Action Plan, we observed that among the various sources of dust present at the Mine, the crusher, the Port and along the Tote and Mine Haul roads, wheel-entrained dust was the single most significant and important source. The relatively short time to complete the action plan has not permitted the development of an objective measurement program to definitively quantify dust from each of the sources, nor is such a program actually necessary. Many years of experience in addressing dust management issues in the Arctic, Sub-Arctic and many other locations around the world provide an appropriate lens through which the dust issues at Baffinland can be viewed and addressed.

Though wheel-entrained dust is considered the most important source of dust on the site in general, Golder notes that between dust generation and erosion issues related to moving water on and near the road, airborne dust deposition is the least likely to lead to inappropriate levels of total suspended solids in the areas' water bodies.

2.1.2 Wind-blown Dust

Wind-blown dust on the Tote Road is also recognized as a source of dust. The following (in italics) is an excerpt from the United States Environmental Protection Agency (U.S. EPA). It is part of the introductory section of the Fugitive Dust Sources Chapter (13.2):

> *Significant atmospheric dust arises from the mechanical disturbance of granular material exposed to the air. Dust generated from these open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream. Common sources of fugitive dust include unpaved roads, agricultural tilling operations, aggregate storage piles, and heavy construction operations.*

In general terms, wind-blown dust could be expected when dry conditions, fine materials (particles <75 µm) on the road surface and relatively strong winds (over 19 km/hr) prevail. If any of these three factors are not present, wind-blown dust should be considered a negligible source.

While on site for the reconnaissance visit in mid-August, which was largely characterized by dry, windy conditions, we did observe the presence of wind-blown dust along the Tote Road. While these conditions were occasionally present during our visit, our observations during the multi-day visit and complete travel of the Tote Road suggest that wind-blown dust is a small source, especially when compared to the dust generated through wheel entrainment. Given our assertion that even wheel-entrained dust should be considered a minor contributor to sediment loading in local water bodies, the importance of wind-blown dust in the overall management of in-stream sedimentation is low.

2.1.3 Losses from the Ore Haul Truck Boxes

Ore is loaded into open-topped side-dump style haul trucks for transport along the Tote road from the crusher area at the mine site to the Milne port. There is some potential that iron ore dust, when exposed to the wind could be caught by the wind and be blown out of the truck box. During a site visit in mid-August, it was apparent, even through visual observation, that this potential source is not an important contributor to dust. The iron ore has a high density and is not easily moved by wind. No dust was observed to be leaving the trucks as they moved along the Tote Road.

2.2 What actions have been undertaken to date to address each of the identified sources?

Baffinland has undertaken a number of actions over the course of the summer season to control dust emissions related to travel along the haul road. They include the following:

- Road Resurfacing;
- Application of Chemical Suppressant; and
- Application of Water.

2.2.1 Wheel Entrainment

The single most substantial reduction in the amount of dust produced that has been achieved to date related to wheel entrainment has been the application of chemical dust suppressant (CaCl), followed by grading and water application to the Tote Road running surface. Our observations suggest that when an appropriate running surface is adequately treated and maintained, that dust generation was considerably reduced. Though a specific measurement program was not conducted to support this claim, it is widely known in the dust management industry that reductions of 80% are readily achievable using this treatment regime. In the areas of the Tote Road where chemical suppressants and watering were employed, they were effective and we suggest that an 80% reduction in dust generation was achieved.

Progress was made in the spring and summer of 2016 on resurfacing portions of the Tote Road. Note that the limited re-topping of the Tote Road running surface that has been completed to date has not, nor would it be expected to be effective in controlling dust emissions on its own. For re-topping alone to be effective, the material would need to be unduly coarse, and would lead to haul-truck maintenance issues.

2.2.2 Wind-blown Dust

The same activities that led to meaningful reductions in dust generation on areas of the Tote Road related to wheel entrainment were also effective in controlling wind-blown dust from the surface of the road. The combination of a structurally sound road embankment and running surface coupled with the integration of chemical suppressants and watering have been effective in the areas where the application has been substantially completed. The road maintenance team was observed to be actively engaged in dust suppression activities at various locations along the Tote Road.

2.2.3 Losses from the Ore Haul Truck Boxes

As described in Section 2.1.3, losses from the ore haul truck boxes play a very minor, even negligible role in dust management at Baffinland and an even less significant role in the contribution of sediment to waterbodies in the vicinity of the Tote Road. No specific action has been taken to limit dust transport from the boxes of the ore haul trucks.

2.3 What additional actions will be undertaken to address each of the identified dust sources?

2.3.1 Wheel Entrainment

Section 2.2.1 of this action plan discussed in some detail the actions that have been undertaken to date to limit the amount of dust released from the Tote Road surface as a function of wheel entrainment. The continuation of the three identified activities is recommended including road resurfacing with durable, coarse, granular fills, the application and integration of chemical dust suppressants (CaCl) and road watering. The coordination of these activities should be directed through the Tote Road management plan which will be updated over the winter of 2016/17 and will be in place prior to the 2017 "dust season." The dust season refers to the period nominally between June and October where it is reasonable to expect that the Tote Road surface would be bare. A compacted snow veneer on the Tote Road is expected to reduce dust emissions by approximately 95% between November and May.

Progress was made in the spring and summer of 2016 on resurfacing portions of the Tote Road. Because the season for road improvements has largely passed for 2016, the resurfacing activities will need to resume after the break-up season in 2017, after the frost has left the active layer and the road embankment has dried to the point where it can be improved with blading and supplemental materials without doing damage in the process. The length of the Tote Road should be brought up to a specification that includes a minimum of 150 mm depth of coarse granular fill over several years and will require regular maintenance over time to maintain the running surface and manage dust.

The application of a durable and workable running surface will not appreciably reduce dust generation without the integration of chemical suppressants and regular maintenance through road watering. The August 2016 sea-lift brought an additional 20 sea containers of CaCl to the site for use on the Tote Road and other high priority areas. CaCl should be applied using the existing tandem-axel spreader truck in the dust season as needed until the compacted snow veneer is established on the road.

CaCl suppressant works primarily by retaining existing soil moisture at the surface and promoting the “cementing” and retention of fine materials in the road surface. From time to time however, the road embankment and surface will dry to the point where the presence of CaCl alone will not materially affect dust generation. Supplemental watering of the Tote Road is recommended through the use of the existing “740 water truck”, and the existing, smaller, tandem water truck in the dust season. The existing tandem water truck should be retrofitted to improve the efficiency of distribution of water through an appropriate spreader-bar and pump. The tandem water truck should also be fitted with a filling fixture so that it can be filled with a six-inch pump to reduce filling times. Additional water truck capacity should be added to the Tote Road water truck fleet. The retrofits and increased watering capacity are expected to considerably increase the efficiency of watering on the Tote Road.

2.3.2 Wind-blown Dust

The actions proposed to manage wind-blown dust are the same as those prescribed to manage wheel-entrained dust. No additional actions are required or proposed beyond those being taken to limit wheel-entrained dust. Wind-blown dust is considered a minor source relative to the wheel-entrained dust.

2.3.3 Losses from the Ore Haul Truck Boxes

Observations made during a site visit in mid-August suggest that the amount material being deposited on and adjacent to the Tote Road related to ore dust being blown out of the truck boxes is negligible. No additional actions are proposed to limit the very small potential for deposition to water bodies adjacent to the Tote Road from this dust source.

Table 2-1 summarizes the dust mitigations actions planned for the Tote Road.

Table 2-1 Tote Road Dust Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Chemical suppressant (CaCl) application	Ore Handling	Summer months every year
Road watering equipment retrofit and supplement	Ore Handling	Retrofit completed by May 31, 2017, supplemental equipment to arrive on 2017 sea-lift
Road watering	Ore Handling	Summer months every year

3.0 CRUSHER PAD

Dust generated from use of the crusher pad is one of the items identified in the FAD that requires attention. The crusher pad is located at the mine site at the bottom end of the mine haul road. The equipment on it is used to process raw ore that has been transported from the mine into pieces nominally 30 mm in diameter (lump ore) and 19 mm in diameter (fines), to stock pile it temporarily and then to load it into the haul trucks for transport on the Tote Road to the Milne Port. The crushing facilities on the pad are also used to crush granitic materials to produce aggregate for various purposes at the mine including road building.

3.1 What are the mechanisms for dust generation on the crusher pad?

There are several important sources of dust generation on the crusher pad. Some are similar to those already discussed in Section 2 of the Action Plan relating to the Tote Road and others are related specifically to the processing of iron ore and aggregate. The important sources include the following:

- Wheel Entrainment;
  - Haul truck
  - Front-end loader
- Wind-blown Dust;
- Conveyor Transfer Points;
- Ore Discharge to Surge Pile;

3.1.1 Wheel Entrainment

The mechanism whereby wheel-entrained dust is generated is discussed in detail in Section 2.1.1. It is considered the most important source of dust on the site in general and in the case of the crusher pad, wheel-entrained dust sources include the movement of front-end loaders used for managing the stockpiles and for loading haul trucks, and the movement of the haul trucks on the crusher pad. We note that between dust generation and erosion issues related to moving water on and near the pad, airborne dust deposition is the least likely to lead to inappropriate levels of total suspended solids in the areas' water bodies.

3.1.2 Wind-blown Dust

Wind-blown dust on the crusher pad is also recognized as a source of dust. The mechanism that drives wind-blown dust is discussed in detail in Section 2.1.2. While on site for the reconnaissance visit in mid-August, which was largely characterized by dry, windy conditions, we did observe the presence of a small amount of wind-blown dust at the crusher pad. While these conditions were occasionally present during our visit, our observations during the multi-day visit and ongoing observations suggest that wind-blown dust is a small source, especially when compared to the dust generated through wheel entrainment. Given our assertion that even wheel-entrained dust should be considered a minor contributor to sediment loading in local water bodies, the importance of wind-blown dust in the overall management of in-stream sedimentation is low.

3.1.3 Conveyor Transfer Points

Each of the conveyor transfer points in the crushing circuit and the crushing and screening activities themselves are categorized here generally as conveyor transfer points. The mechanism for dust generation at these locations is similar in each case and regardless of the specific activity, the control effort will take a similar form. As the materials being crushed make their way through the crushing circuits, fines are generated through friction due to abrasion with other aggregate materials being processed and through direct interaction with the hard surfaces of the equipment. In some cases, the fines are retained in the flow of materials and do not become airborne. In other cases, for example where one conveyor discharges to another, materials are dropped a short distance and can become exposed to the prevailing ambient wind of the day. In another example, where materials are separated by size on a screen deck, they can become temporarily suspended in the air. In both these examples, dust can be lost to the wind and transported a short distance from the crusher pad or simply onto the crusher pad itself without leaving the immediate area.

3.1.4 Ore Discharge to Surge Pile

The dust generation associated with the discharge of fine ore to its dedicated surge pile is of particular note. Of the sources not related directly to wheel entrainment on the crusher pad, this source was the most important. During some periods, fine ore and its higher percentage of fines drops a few metres to the surge pile. Under windy conditions, a visible plume of dust was observed being entrained by the wind as the materials cascaded to the surge pile. This is a more important source than much of the rest of the activity in the crushing circuit because the length of time of exposure to ambient wind is considerably greater at this location than at other points in the circuit. It is important to note that wheel entrainment is a more important source by a wide margin.

3.2 What actions have been undertaken to date to address each of the identified dust sources?

In some cases, it was possible to mitigate dust sources on the crusher pad immediately after they were noted during the reconnaissance and inspection visit.

3.2.1 Wheel Entrainment

Upon becoming aware that wheel-entrained dust on the crusher pad was a potentially significant dust source, immediate mitigation action was taken to provide road watering trucks to wet the surface of the crusher pad. Chemical suppressants were not used, nor are they planned for the crusher pad location as they can impact iron ore product quality. The mitigating effects observed due to watering were significant.

3.2.2 Wind-blown Dust

Because there is a substantial amount of traffic on the crusher pad, mechanical pulverizing of the pad materials can make very fine material available for entrainment by the ambient wind. This was observed in small measure at the crusher pad. The actions taken as described in Section 3.2.1 to control wheel-entrained dust were equally effective, timely and appropriate for controlling wind-blown dust where it was observed, primarily on the road portion of the crusher pad.

3.2.3 Conveyor Transfer Points

No specific actions have yet been taken to limit the dust generated at the conveyor transfer points and from various crushing activities. Preliminary discussion about the actions that could be taken have occurred but in each case, some level of engineering and preparation is required to implement the appropriate mitigation.

3.2.4 Ore Discharge to Surge Pile

No specific actions have yet been taken to limit the dust generated where ore and crushed aggregates are discharged to the various surge piles. Preliminary discussion about the actions that could be taken have occurred but in each case, some level of engineering and preparation is required to implement the appropriate mitigation.

3.3 What additional actions will be undertaken to address each of the identified sources?

As discussed in Section 3.2, actions have already been taken to address dust emissions from the crusher pad location. Additional actions are warranted and planned. This section addresses the recommended actions to address the additional dust mitigation needs at the crusher pad.

3.3.1 Wheel Entrainment

The most appropriate dust mitigation action that can be undertaken at the crusher pad regarding wheel entrainment-related dust at the crusher pad is to maintain a moist surface. When the surface is wet, dust generation is typically controlled by approximately 80%. Dust literature suggests that when theoretical calculations of dust are required for assessment purposes, days where there is measureable precipitation (rain or snow) can be considered non-generating days. Systematic watering of the crusher pad surface can be used during the dust season (typically June-September) until the establishment of a compacted snow veneer.

3.3.2 Wind-blown Dust

As described in Section 3.3.1, watering of the pad surface in the dust season is the most effective way to control dust from the crusher pad related to wheel entrainment. When wheel-entrained dust is controlled, wind generated dust will also necessarily be controlled. No additional actions outside of those used to control wheel-entrained dust are proposed for controlling wind-blown dust.

3.3.3 Conveyor Transfer Points

Section 3.2.3 indicated that some level of planning, engineering and procurement may be required to develop an appropriate dust mitigation approach for the crusher conveyor transfer points and other areas in the crusher circuit where materials are temporarily suspended in the air where they could be subject to ambient wind. The primary method of controlling dust at these locations is to enclose the transfer point to the extent possible to reduce the exposure of suspended materials to the wind. The design of equipment shrouding, where there is potential for suspended fines to be exposed to and entrained by the wind, is underway and the shrouding of the transfer points and other exposed locations in the crusher circuit should be completed by June 1, 2017.

3.3.4 Ore Discharge to Surge Pile

Though considered a relatively minor source compared to wheel entrainment at the crusher pad, the discharge point from the crusher circuit to the surge various surge piles is still a source of dust. The potential use of loading bellows fitted to the point of discharge from the conveyors to the surge piles should be evaluated for possible installation prior to the 2017 dust season.

3.3.5 Aggregate-specific Crushing Operations

Observations by mine personnel suggest that crushing aggregate, not iron ore can lead to higher levels of airborne dust. To specifically control dust associated with crushing aggregate, Baffinland should install a water spray-bar on the aggregate crusher spread or feed pile. Watering in the summer months is expected to considerably mitigate dust generation from this source.

Table 3-1 summarizes the dust mitigations actions planned for the Crusher Pad

Table 3-1 Crusher Pad Dust Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Pad watering	Ore Handling	Summer months every year
Installation of shrouding at crusher circuit transfer points	Crushing	December 31, 2017
Install bellows at stockpile conveyor head(s) – fines head first	Crushing	Winter 2016/2017
Install downwind snow fence to limit dustfall transport - trial basis	Crushing	October 31, 2016
Install spray-bar on aggregate crusher spread or feed pile	Crushing	May 1, 2017

4.0 MILNE PORT ORE STOCKPILES

The Milne Port facility serves as a receiving and temporary storage facility for iron ore being transported from the mine and crushers along the Tote Road, prior to being loaded onto bulk transport ships in the ice-free season. Dust is generated from a number of activities at the Milne Port site including from the following:

- Wheel Entrainment from arriving and departing haul trucks, front-end loaders and other smaller equipment necessary for operating the facility;
- Wind-blown Dust from the storage piles and the traveled areas of the pad; and
- To a lesser extent, losses from ore haul truck boxes.

4.1 What are the mechanisms for dust generation at the Milne Port?

4.1.1 Wheel Entrainment

The mechanism whereby wheel-entrained dust is generated is discussed in detail in Section 2.1.1. It is considered the most important source of dust on the site in general and in the case of the Milne Port Ore Stockpiles, wheel-entrained dust sources include the movement of front-end loaders used for managing the stockpiles and the movement of the haul trucks on the pad.

4.1.2 Wind-blown Dust

Wind-blown dust at the Milne Port is also recognized as a source of dust. The mechanism that drives wind-blown dust is discussed in detail in Section 2.1.2. While on site for the reconnaissance visit in mid-August, which was largely characterized by dry, windy conditions, we did observe the presence of a small amount of wind-blown dust at the Milne Port pad. While these conditions were occasionally present during our visit, our observations during the multi-day visit and ongoing observations suggest that wind-blown dust is a small source, especially when compared to the dust generated through wheel entrainment. Given our assertion that even wheel-entrained dust should be considered a minor contributor to sediment loading in local water bodies, the importance of wind-blown dust in the overall management of in-stream sedimentation is low.

4.1.3 Losses from the Ore Haul Truck Boxes

Losses from the boxes of ore-haul trucks has been described as a potential source of dust deposition in Section 2.1.3. We assert that at the Milne Port site, the potential for iron ore dust to be liberated from the haul truck boxes in any meaningful quantities is exceptionally low. It is described in this section to account for the concern that has been raised on the matter but our opinion is that the contributions to dust deposition from this source are negligible.

4.2 What actions have been undertaken to date to address each of the identified dust sources?

4.2.1 Wheel Entrainment

The most appropriate dust mitigation action that can be undertaken at the Milne Port regarding wheel entrainment-related dust is to maintain a moist surface whenever possible. When the surface is wet, dust generation is typically controlled by approximately 80%. Systematic watering of the Milne Port haul truck route across the pad surface during the dust season is being completed. Chemical suppressants are not used for the crusher pad area because of the potential for contamination of the ore.

4.2.2 Wind-blown Dust

Because of the considerable traffic present at the Milne Port, mechanical pulverizing of the pad materials can make very fine material available for entrainment by the ambient wind. This however, was not observed during a visit to the facility. No specific actions have been undertaken to limit wind-blown dust at the facility that are not part of the inherent design of the facility. Inherent design characteristics include the use of stackers instead of front-end loaders where possible, the use of covered conveyors that are in good repair for transferring iron ore from the stockpiles to the ships and the use of loading bellows by the ship-loaders. Each of these components of the design serve to control the transmission of fine particles from their point of origin to the surrounding environment.

4.2.3 Losses from the Ore Haul Truck Boxes

Iron ore dust being blown out of the ore-haul truck boxes is not a significant source of dust; therefore, no specific action has been taken to limit this source.

4.3 What additional actions will be undertaken to address each of the identified mechanisms?

4.3.1 Wheel Entrainment

The most appropriate dust mitigation action that can be undertaken at the crusher pad regarding wheel entrainment-related dust at the crusher pad is to maintain a moist surface. The systematic watering of the crusher pad surface during the dust season should be continued to maintain dust mitigation.

4.3.2 Wind-blown Dust

As described in Section 4.3.1, watering of the Milne Port pad surface in the dust season is the most effective way to control dust from wheel entrainment. When wheel-entrained dust is controlled, wind generated dust will also necessarily be controlled. No additional actions outside of those used to control wheel-entrained dust are proposed for controlling wind-blown dust.

On occasion, it is expected that despite best efforts, some dust may be moved by the wind off the pad. A snow fence system is proposed to limit the spatial extent of the deposition of dust so that it can be more efficiently managed and removed prior to snow melt. The use of snow fence to minimize dust movement will tested in the immediate vicinity of the crusher pad.

4.3.3 Losses from the Ore Haul Truck Boxes

No additional actions are proposed to control dust losses from the ore haul truck boxes.

Table 4-1 summarizes the dust mitigations actions planned for the Milne Port Ore Stockpiles

Table 4-1 Milne Port Ore Stockpiles Dust Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Pad watering	Ore Handling	Summer months every year
Install downwind snow fence to limit dust fall transport - trial basis	Ore Handling	October 31, 2016

5.0 MINE HAUL ROAD

The mine haul road is a 6 km-long gravel road used to transport raw ore from the mine down the mountain to the crushing facilities where it is processed and loaded for transport along the Tote Road to the Milne Port.

5.1 What are the mechanisms for dust generation on the Mine Haul Road?

There are two important mechanisms involved in generating dust along the mine haul road. Each of these mechanisms could result in dust being transported from the road to the immediately adjacent land and potentially into nearby water bodies. The two ways that dust generation has been observed include:

- Wheel Entrainment; and
- Wind-blown Dust.

5.1.1 Wheel Entrainment

The mechanism whereby wheel-entrained dust is generated is discussed in detail in Section 2.1.1. It is considered the most important source of dust on the site in general and in the case of the mine haul road, primarily includes the movement of haul trucks up and down the mountain and light vehicle traffic. We note that between dust generation and erosion issues related to moving water on and near the mine haul road, airborne dust deposition is the least likely to lead to inappropriate levels of total suspended solids in the areas' water bodies.

5.1.2 Wind-blown Dust

Wind-blown dust on the Tote Road is also recognized as a source of dust. The mechanism that drives wind-blown dust is discussed in detail in Section 2.1.2.

While on site for the reconnaissance visit in mid-August, which was largely characterized by dry, windy conditions, we did observe the presence of wind-blown dust along the mine haul road. While these conditions were occasionally present during our visit, our observations during the multi-day visit and travel of the mine haul road suggest that wind-blown dust is a small source, especially when compared to the dust generated through wheel entrainment.

5.2 What actions have been undertaken to date to address each of the identified sources?

5.2.1 Wheel Entrainment

The single most substantial reduction in the amount of dust produced that has been achieved to date related to wheel entrainment on the mine haul road has been the application of water using a dedicated 740 water truck. Our observations suggest that when an appropriate running surface is adequately treated and maintained, that dust generation was considerably reduced.

5.2.2 Wind-blown Dust

The same activities that led to meaningful reductions in dust generation on areas of the mine haul road related to wheel entrainment were also effective in controlling wind-blown dust from the surface of the road. The application of water has been effective in controlling wheel-entrained dust and in controlling wind-blown dust. The mine road maintenance team was observed to be actively engaged in dust suppression activities on the mine haul road.

5.3 What additional actions will be undertaken to address each of the identified dust sources?

5.3.1 Wheel Entrainment

The activities currently being undertaken at the mine haul road to control dust have been quite effective. Additional gains could be made, however, by spending less time filling the water truck and more time applying water. It was noted during the site visit that the water truck was being filled using a four-inch pump and a fill time of approximately 35 minutes was common. Retrofitting the water truck to accept filling using a six-inch pump will significantly reduce the amount of time the water truck takes to fill and additional operator time can be spent watering the roads instead of waiting for the truck to fill. Retrofitting the water truck to improve efficiency should be implemented prior to the 2017 dust season.

A pilot program to test the effectiveness of the application of chemical suppressants in this setting is proposed for the summer of 2017 as well. Chemical suppressants anticipated for testing include CaCl and EK-35. Other suppressants may be included in the testing program as appropriate.

5.3.2 Wind-blown Dust

The actions proposed to manage wind-blown dust are the same as those prescribed to manage wheel-entrained dust. No additional actions are required or proposed beyond those being taken to limit wheel-entrained dust. Wind-blown dust is considered a minor source relative to the wheel-entrained dust.

Table 5-1 summarizes the dust mitigations actions planned for the Mine Haul Road.

Table 5-1 Mine Haul Road Dust Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Chemical suppressant (CaCl) or EK-35 application (subject to performance of pilot program)	Mine Operations	August 31, 2017
Road watering equipment retrofit and supplement	Mine Operations	Retrofit completed by May 31, 2017
Road watering	Mine Operations	Summer months every year

6.0 MINE AND MILNE PORT SITE

Though the specific areas of the mine are not discussed directly in the FAD, Baffinland considers it important to include them in the general discussion around dust management at the site. Dust generation arising from vehicle use at the various pads, laydowns and parking areas was apparent during a site visit in mid-August and the desired holistic approach to management would not be possible without consideration of these areas.

6.1 What are the mechanisms for dust generation at the Mine and Milne Port Site pads, laydowns and parking areas?

As discussed in detail in each of the sections above, wheel entrainment and wind-blown dust each play an important role in the generation of dust at the Baffinland operation and the mine site pads, laydowns and parking areas are also prone to dust generation from these sources.

6.1.1 Wheel Entrainment

The mechanism whereby wheel-entrained dust is generated is discussed in detail in Section 2.1.1. Wheel-entrained dust is considered the most important source of dust on the site in general and in the case of the mine site pads, laydowns and parking areas, wheel-entrained dust sources primarily include the movement of light traffic and heavy equipment. We note that between dust generation and erosion issues related to moving water on and near the pads, laydowns and parking areas , airborne dust deposition is the least likely to lead to inappropriate levels of total suspended solids in the areas' water bodies.

6.1.2 Wind-blown Dust

Wind-blown dust at the mine site pads, laydowns and parking areas are a recognized as a source of dust. While on site for the reconnaissance visit in mid-August, which was largely characterized by dry, windy conditions, we did observe the presence of wind-blown dust at many of these locations. While these conditions were occasionally present during our visit, our observations during the multi-day visit suggest that wind-blown dust is a small source, especially when compared to the dust generated through wheel entrainment.

6.2 What actions have been undertaken to date to address each of the identified sources?

6.2.1 Wheel Entrainment

Upon becoming aware of the dust issue at the mine site, a plan was developed to have the mine road water truck extend its route to include some of the pads, laydowns and parking areas. When water was applied, considerable reductions in dust generation were noted.

6.2.2 Wind-blown Dust

The same actions taken to reduce dust generation arising from wheel entrainment are applicable to mitigate wind-blown dust.

6.2.3 Airstrip Dust Mitigation

A dedicated dust suppression program using a specialized dust suppressant (EK-35) is being evaluated for the mine site airstrip.

6.3 What additional actions will be undertaken to address each of the identified dust sources?

6.3.1 Wheel Entrainment

The mine haul water truck and the Tote Road water truck will be coordinated and deployed to water the pads, laydowns and parking areas. The evaluation of the EK-35 suppressant program will continue at the airstrip.

6.3.2 Wind-blown Dust

The mine haul water truck and the Tote Road water truck will be coordinated and deployed to water the pads, laydowns and parking areas.

Table 6-1 summarizes the dust mitigations actions planned for the Mine and Milne Port Site.

Table 6-1 Mine and Milne Port Site Dust Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Apply chemical dust suppressant on pads, laydowns, and parking areas (calcium chloride)	Site Services	Summer months every year
Evaluate the use of EK-35 at the airstrip	Site Services	Continue
Apply water as a dust suppressant	Site Services	Summer months every year

7.0 SUMMARY AND CONCLUSIONS

Wheel-entrained road dust is the single most important source of dust to be controlled at the Baffinland site; however, it should be noted, that as it relates to sedimentation in local streams and water bodies, even wheel-entrained dust should be considered a relatively small source in comparison to the erosion potential of water transporting sediments to water bodies.

There is a considerable amount of effort and expense that has gone into the reduction of dust generation at the Baffinland facility over the course of the summer of 2016. In many cases, the efforts have been rewarded with substantial reductions in dust generation. Road resurfacing, the application of chemical suppressants and watering have all played a role in the effort and results to date. More remains to be done, however, to appropriately mitigate dust generation. Depending on the area of the operation in question, this could mean:

- retrofitting equipment to be more efficient (water truck filling or dispensing),
- acquiring additional equipment (additional water truck) or supplies (CaCl, EK-35 or other), or
- adding dust control devices like shrouds and loading bellows at various points in the crushing circuits.

With a coordinated approach to dust management as described in this action plan, significant additional gains can be realized that will contribute to the overall reduction of sediment in local water bodies.

8.0 STUDY LIMITATIONS

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Report Signature Page

GOLDER ASSOCIATES LTD.

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Attachment C

Sedimentation Mitigation Action Plan

September 29, 2016

MARY RIVER PROJECT

Sedimentation Mitigation Action Plan, Rev.1

Submitted to:
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville ON L6H 0C3

REPORT

Project Number: 1661774 (5000)

Distribution:

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TABLES

1.0 INTRODUCTION

On May 10, 2016, Mr. James Millard, Baffinland Iron Mines Corporation (Baffinland) Environmental Manager, provided an email report to Mr. Curtis Didham, an Inspector designated by the Minister of Fisheries and Oceans (EO Didham), that on May 7, 2010, a snowmelt event occurred at the Mary River Project site that led to sediment-laden runoff flowing into Sheardown Lake. Further, on May 17, 2016, Mr. Allan Knight, Baffinland Environmental Superintendent, reported to Northern District Spills Duty Officer, EO MacDonald that a snowmelt event resulted in runoff containing sediments was observed to be flowing into Camp Lake Tributary #1 and into Camp Lake. EO MacDonald forwarded the report to EO Didham. These events, singularly and collectively, set in motion a process of sample collection, laboratory analysis, reporting, and ultimately resulted in a Baffinland site visit and inspection by EO Didham, Indigenous and Northern Affairs Canada (INAC) Water Resource Officers Justin Hack and Jonathan Mesher and INAC Environmental Assessment Officer Jason Patchell on May 18 and 19, 2016.

A number of outcomes resulted from the site visit and inspection of the Mary River Project site including a *Fisheries Act Direction* (FAD), dated June 7, 2016, to remedy a number of the immediate issues and to develop and implement two action plans by September 30, 2016:

1) A Dust Mitigation Action Plan with an implementation schedule addressing crushing operations, wind coming in contact with the crushed rock/iron stockpiles and vehicle traffic on the Tote Road; and

2) A Tote Road and Mine Haul Road Mitigation Action Plan with an implementation schedule addressing sediment water runoff from the road in to culverts, ditches and creeks/streams which lead to David, Mural, Kabikok, KM 32, KM 27, Camp and Sheardown Lakes, and into the Mary River and Phillips Creek.

The mitigation action plans were developed to address the specific areas noted in the FAD and to also address other areas on the site where dust and sediment could become an issue in the future. The mitigation action plans have been developed as separate deliverables consistent with the direction, but it is important to recognize that they are closely related to each other and will be synergistic when they are implemented together. This document deals specifically with Item 2, above. As this document includes the various sources of sediment at the Tote Road, the Mine Haul Road, the crusher pad, the Milne Port ore stockpile, and the Mine and Milne Port Sites, it is titled the *Sedimentation Mitigation Action Plan*.

Baffinland retained Golder Associates Ltd. (Golder) to prepare both the Dust Mitigation Action Plan and the Sedimentation Action Plan. The preparation of these plans included a site visit by Messrs. Chris Madland, Senior Air Quality Scientist, and Paul Bedell, PEng, Senior Geotechnical Engineer, of Golder from August 12 to August 16, 2016, inclusive. Extensive discussions between Baffinland personnel and Golder were carried out to develop the plans.

The Reader is referred to the Study Limitations (Section 9.0), which follows the text and forms an integral part of this document.

2.0 TOTE ROAD

The Tote Road extends from the Milne Port to the Mine Site and is approximately 104 km in length. The crushed ore is hauled to the Milne Port Ore Stockpile (Section 5.0) from the Crusher Pad (Section 4.0) by B-train haul trucks that traffic the Tote Road.

2.1 Sediment Sources

The following are identified as the primary sources of sediment water runoff from the Tote Road into culverts, ditches, creeks, and streams:

- Sediment-contaminated snow melt. Snow management practices have resulted in sediment-laden meltwater, from snow cleared from the road, reporting to the receiving environment.
- Road embankment erosion at some culvert locations. Steep road embankments, due to short culverts, are prone to erosion and challenge proper armouring with rip rap. Short culvert lengths also result in narrow road widths which result in traffic safety issues. The lack of sufficient rip rap placement at culverts inlets and outlets, even those with flatter slopes, also results in erosion of the road embankment.
- Insufficient drainage of the running surface resulting in runoff and erosion of running surface. Runoff along steeper sections of the road increases erosion of the road and sediment loading to the ditches and/or the receiving environment. Low-lying sections of the road are prone to the ponding of water, seasonally or as a result of rainfall events; these sections are prone to road deterioration and generate sediment-laden runoff to the ditches and/or receiving environment. Finer-grained road surfacing fills are especially prone to generating sediment, especially during intensive maintenance activities.
- Insufficient sizing and armouring of roadside ditches. Erosion of the ditches in steeper sections results in sediment-laden flows that report to the receiving environment.
- Cut-slope instability resulting from permafrost degradation. Ice-rich permafrost and fine-grained soils, upon thawing, result in sediment-laden flows to ditches, culverts, the road surface, and directly to the receiving environment. Cut-slopes into ice-rich permafrost and fine-grained and fine-grained soils exist at several locations along the Tote Road.

2.2 Mitigation Actions Undertaken to Date

Baffinland had undertaken a number of mitigation actions to reduce the adverse impacts of sedimentation on the receiving environment prior to the issuance of the FAD on June 7, 2016. These actions, in addition to those undertaken to the date of this document, include:

- Road resurfacing using high quality and durable granular fills. The placement of these fills has been carried out in select locations along the Tote Road as part of ongoing maintenance and upgrading activities. These fills satisfy the requirements for the Tote Road improvement design (prepared by Hatch Ltd.). Their placement will: reduce sediment generation due to their grain size; improve road drainage performance due to road embankment raising and crowning; and will reduce the generation of sediment-contaminated snow due to their grain size.

- Rip rap placement and check dam construction in roadside ditches. In excess of 4 km of ditch length was armoured with rip rap prior to the 2016 freshet between KM 83+000 and KM 89+000; steeper gradient sections of the road ditch were selectively targeted for rip rap placement. Several check dams were installed at select locations along the ditch to aid in flow control and to enable the use of flocculent. The installation of geotextile, underlying the rip rap, was carried out, in the majority of these areas.
- Rip rap placement at culvert inlets and outlets. The inlets and outlets of several culverts were armoured with rip rap prior to the 2016 freshet to reduce further erosion and generation of sediment.
- Installation of silt fencing, installation of geojute, and use of flocculation. These measures were used at select locations along the roadside ditch, upstream of culverts, and downstream of culverts to reduce the adverse impact of sediment-laded flows on the receiving environment.
- Removal of eroded materials from roadside ditch, creeks, and streams. Eroded materials, for example at KM 97+200 (bridge crossing), were removed from the steams in early 2016.
- Berm construction along the road from about KM 90+100 to KM 90+800 to limit movement of material mobilized from permafrost degradation in cut-slope. This berm was constructed using rip rap and served to retain materials.

2.3 Additional Mitigation Measures to be Undertaken

It is recognized that several mitigation measures need to be undertaken for the proper control of sediment impacts from the Tote Road. These measures need to be scheduled in consideration of seasonality, material availability, and resource requirements. The following general mitigation measures are recommended to be carried out by Baffinland:

- Procurement and bringing into use of a 6-way blade for the snow plows and evaluation of commercial-sized snow blowers for improved snow management based on ability to mobilize the equipment to the site.
- Development of a snow management plan for the Tote Road, including identification of snow dumps and snow clearing requirements, to manage the quantity and spatial extent of sediment-contaminated snow.
- Signage on all fisheries culverts at inlets and outlets.
- Replacement or extension of culverts to improve performance. Priority will be given to fish culverts and those identified having safety concerns. Armouring of culvert inlets and outlets with rip rap will be part of this work.
- Armouring and protection of cut-slopes exhibiting permafrost degradation to limit further erosion and sediment transport.
- Improve water management and drainage on the road surface and ditches. Placement of high quality and durable granular fills in select areas during road maintenance will be carried out. Armouring of ditches with rip rap will be carried out at identified locations to improve ditch performance; construction of check dams will be included in this work. The installation of silt fencing will be used, as required, to reduce the impact of sediment on the receiving environment.

- Removal of sediment laden snow from the ice surfaces of stream crossings.
- The Tote Road monitoring program will be revised. This will require regular visual inspections, including the documentation of areas of concern and required repairs.
- Develop and implement an earthworks execution plan for the Tote Road including; road re-surfacing, culvert replacement and other road improvements in consideration of the design prepared by Hatch Ltd. This requires that the carriageway be three times the width of the largest vehicle and with safety berms, in areas having a 3 m drop-off or greater, the berm having a height of three-quarters the diameter of the largest vehicle's tire; these are requirements of the *Mine Health and Safety Act* of Nunavut.

The summary of the specific mitigation actions recommended is shown in Table 1. The accountable department and completion date are shown for each mitigation action.

Table 1: Tote Road Sedimentation Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Revise and implement snow management plan	Ore Handling (support from Environment)	October 30, 2016
Signage posted on all fisheries culverts (inlets and outlets)	Environment	December 31, 2016
Procure and bring into use 6-way snow plow blade	Ore Handling	November 30, 2016
Replace CV104 culvert	Ore Handling	October 31, 2016
Increase road protection berms, rip rap culvert inlets/outlets, and replace non-functioning small diameter culverts (as required) between KM 90+100 and KM 90+800	Ore Handling	May 1, 2017
Construct water diversion ramps on running surface and check dams in ditch on slopes section near KM 97+200	Ore Handling	May 1, 2017
Remove sediment/dust-impacted snow from river ice surface (beneath bridges)	Ore Handling	As required (April 2017)
Prepare road improvement earthworks execution plan for 2017-and-beyond construction seasons	Ore Handling	February 15, 2017
Evaluate the potential to procure, transport and bring into use commercial-sized snow blower	Ore Handling	September 30, 2017
Replace priority culverts	Ore Handling	May 31, 2017
Execute earthworks execution plan for 2017 construction season - resurfacing	Ore Handling	December 31, 2017
Execute earthworks execution plan for 2017 construction season - balance of priority culverts	Ore Handling	December 31, 2017

3.0 MINE HAUL ROAD

The Mine Haul Road extends from the Crusher Pad (Section 4.0) about 6 km to the open pit. Blasted ore is loaded into CAT777 haul trucks and hauled to the Crusher Pad.

3.1 Sediment Sources

The following are identified as the primary sources of sediment water runoff from the Tote Road into culverts, ditches, creeks, and streams:

- Sediment-contaminated snow melt. Snow management practices have resulted in sediment-laden meltwater, from snow cleared from the road, reporting to receiving environment.
- Sediment from the low quality fills used in previous road embankment construction. These materials are prone to breaking down and are the sediment source to flows along the road surface.
- Cut-slope instability resulting from permafrost degradation. Ice-rich permafrost and fine-grained soils, upon thawing, result in sediment-laden flows to ditches, culverts, the road surface, and directly to the receiving environment. Cut-slopes into ice-rich permafrost and fine-grained and fine-grained soils exist at several locations along the Mine Haul Road.

3.2 Mitigation Actions Undertaken to Date

Baffinland had undertaken a number of mitigation actions to reduce the adverse impacts of sedimentation on the receiving environment prior to the issuance of the FAD on June 7, 2016. These actions, in addition to those undertaken to the date of this document, include:

- Six twin culverts and one single culvert were installed and the existing ditch was protected with rip rap along the mine haul road. The culvert trench was excavated by drilling and blasting due to the frozen ground conditions. The existing ditches were cleared of snow and inspected. Due to the time constraints and weather conditions the existing ditches were not modified. The existing ditches were observed to have little to no erosion protection. Rip rap was added along the length of the ditch, and in steep sections geotextile was placed prior to rip rap. This work was carried out and completed prior to the 2016 freshet.
- Road resurfacing using high quality and durable granular fills. The placement of these fills has been carried out since May 2016 in select locations along the Mine Haul Road as part of ongoing maintenance and upgrading activities. Their placement will: reduce sediment generation due to their grain size; improve road drainage performance due to road embankment raising and crowning; and will reduce the generation of sediment-contaminated snow due to their grain size.

3.3 Additional Mitigation Measures to be Undertaken

It is recognized that several mitigation measures need to be undertaken for the proper control of sediment impacts from the Mine Haul Road. These measures need to be scheduled in consideration of seasonality and material and resource requirements. The following general mitigation measures are recommended:

- Improve water management and drainage on the road surface through the placement of high quality and durable granular along the entire Mine Haul Road. The placement of these durable fills will encapsulate the lower quality fills within the original road embankment to limit further degradation and reduce the ability for sediment generation.
- Revision of the snow management plan for the Mine Haul Road, including identification of snow dumps and snow clearing requirements, to manage the quantity and spatial extent of sediment-contaminated snow.
- Enact a program of sediment removal from the culvert inlet basins on an “as required” basis.
- Armouring and protection of cut-slopes exhibiting permafrost degradation to limit further erosion and sediment transport.
- A Mine Haul Road monitoring program will be developed. This will require regular visual inspections by including the documentation of areas of concern and required repairs.

The summary of the specific mitigation actions recommended is shown in Table 2. The accountable department and completion date are shown for each mitigation action.

Table 2: Mine Haul Road Sedimentation Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Revise and implement snow management plan	Mine Operations (support from Environment)	October 15, 2016
Develop strategy to manage flows on running surface	Mine Operations	March 31, 2017
Remove sediment from culvert inlet basins	Mine Operations	As required
Running surface resurfacing	Mine Operations	September 30, 2017
Develop requirements for area downstream of Mine Haul Road and culverts (permafrost degradation area)	Mine Operations	March 31, 2017
Implement strategy to manage flows on running surface	Mine Operations	September 30, 2017
Implement short term mitigation for area downstream of Mine Haul Road and culverts	Mine Operations (support from Environment)	March 31, 2017

4.0 CRUSHER PAD

The Crusher Pad is the location where ore, hauled from the open pit, is crushed, stockpiled, and loaded into B-train trucks for haulage to the Milne Port Stockpile (Section 5.0). Two ore crushing setups and a single aggregate crushing setup are located on the Crusher Pad. The aggregates produced at the Crusher Pad are used across the site, as required, for granular fills.

4.1 Sediment Sources

The following are identified as the primary sources of sediment water runoff from the Tote Road into culverts, ditches, creeks, and streams:

- Sediment-contaminated snow melt. Snow management practices have resulted in sediment-laden meltwater, from snow cleared from the Crusher Pad, reporting to receiving environment.
- Sediment-contaminated snow from wind-blown dust generated during ore and aggregate crushing and loading activities.

4.2 Mitigation Actions Undertaken to Date

Baffinland had undertaken a number of mitigation actions to reduce the adverse impacts of sedimentation on the receiving environment prior to the issuance of the FAD on June 7, 2016. These actions, in addition to those undertaken to the date of this document, include:

- Maintenance to the Crusher Pad surface to improve runoff management. This work included the placement of granular fills and the re-grading of the pad surface resulting in better runoff management. Runoff is directed to the collection sump adjacent to the Crusher Pad.
- Reconfiguration and armouring of the south bank of the Crusher Pad. Material was removed and rip rap was placed to reduce the erosion of finer-grained fills.

4.3 Additional Mitigation Measures to be Undertaken

It is recognized that several mitigation measures need to be undertaken for the proper control of sediment impacts from the Crusher Pad. The following general mitigation measures are recommended:

- Revision of the snow management plan for the Crusher Pad, including identification of snow dumps and snow clearing requirements, to reduce the quantity and limits of sediment-contaminated snow.
- Installation of a downwind snow fence system (nominally on the south and southeast margins of the Crusher Pad) to test the ability of snow fence to manage the spatial extent of wind-blown sediments and sediment-laden snow and to permit the efficient removal of sediment laden snow, should it become apparent over the winter season.
- Develop the design of a potential sedimentation pond system in the drainage adjacent to the Crusher Pad. This design would be constructed should the dust mitigation actions to reduce dust fall from the Crusher Pad be insufficient. This design will be prepared such that it can be constructed in the summer of 2017, if required.

The summary of the specific mitigation actions recommended is shown in Table 3. The accountable department and completion date are shown for each mitigation action.

Table 3: Crusher Pad Sedimentation Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Revise and implement snow management plan	Crushing (support from Environment)	October 31, 2016
Design potential downstream sedimentation pond system as a contingency measure	Crushing (support from Environment)	February 28, 2017

5.0 MILNE PORT ORE STOCKPILE

The Milne Port Ore Stockpile is the location for ore storage prior to loading and shipping. Ore hauled from the Crusher Pad (Section 4.0) along the Tote Road (Section 2.0) is stockpiled at the Milne Port Ore Stockpile facility using loaders and conveyors for stacking. Ships are loaded using the ship loader; this is fed by loaders and conveyors.

5.1 Sediment Sources

The following is identified as the primary sources of sediment water runoff from the Milne Port Ore Stockpile facility:

- Sediment-contaminated snow melt from the stockpile area and on the beach area.

5.2 Mitigation Actions Undertaken to Date

Baffinland had undertaken a number of mitigation actions to reduce the adverse impacts of sedimentation on the receiving environment prior to the issuance of the FAD on June 7, 2016. These actions, in addition to those undertaken to the date of this document, include:

- Construction of ditching around the perimeter of the stockpile facility to intercept and route runoff to the sedimentation ponds.
- Removal of contaminated snow from the beach. This activity is carried out prior to the onset of melting conditions.

5.3 Additional Mitigation Measures to be Undertaken

It is recognized that several mitigation measures need to be undertaken for the proper control of sediment impacts from the Milne Port Ore Stockpile facility. The following general mitigation measures are recommended:

- Revision of the snow management plan for the facility, including identification of snow dumps and snow clearing requirements, to reduce the quantity and limits of sediment-contaminated snow.
- Installation of a downwind snow fence system (nominally on the northwest margins of the Milne Port Ore Stockpile facility) to test the ability of snow fence to manage the spatial extent of wind-blown sediments and sediment-laden snow and reduce the amount of sediment laden snow that requires management..
- Removal of contaminated snow from the beach. This activity will be carried out prior to the onset of melting conditions.

The summary of the specific mitigation actions recommended is shown in Table 4. The accountable department and completion date are shown for each mitigation action.

Table 4: Milne Port Ore Stockpile Sedimentation Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Revise and implement snow management plan	Ore Handling (support from Environment)	October 31, 2016
Remove dust-impacted snow from beach area	Ore Handling	As required

6.0 MINE AND MILNE PORT SITES

There are a number of locations at the Mine and Milne Port Sites from which sedimentation may be generated. These include pads, laydowns, and parking areas and their associated drainage infrastructure.

6.1 Sediment Sources

The following are identified as the primary sources of sediment water runoff from the Mine and Milne Port Sites:

- Camp Lake jetty ditching handling runoff from the apron and pad area.
- Sediment-contaminated snow melt from various pads, laydowns, and parking areas.

6.2 Mitigation Actions Undertaken to Date

Baffinland had undertaken a number of mitigation actions to reduce the adverse impacts of sedimentation on the receiving environment prior to the issuance of the FAD on June 7, 2016. These actions, in addition to those undertaken to the date of this document, include:

- Remediation of slope at north end of airstrip. This area experienced erosion of material due to concentrated water flow from the airstrip apron. Some of the material was removed from the toe of the slope. The slope was covered with rip rap and stabilized.
- Remediation of ditch and outflow area at Camp Lake Jetty. Sedimentation ponds were constructed and commissioned to flocculate flows prior to their release to Camp Lake.

6.3 Additional Mitigation Measures to be Undertaken

It is recognized that several mitigation measures need to be undertaken for the proper control of sediment impacts from the Mine and Milne Sites. The following general mitigation measures are recommended:

- Revision of the snow management plan, including identification of snow dumps and snow-clearing requirements, to reduce the quantity and limits of sediment-contaminated snow.
- Construction of a series of check dams along the Camp Lake jetty ramp ditch.

The summary of the specific mitigation actions recommended is shown in Table 5. The accountable department and completion date are shown for each mitigation action.

Table 5: Mine and Milne Sites Sedimentation Mitigation Actions and Implementation Schedule

Action	Accountable Department	Completion Date
Revise and implement snow management plan	Site Services (support from Environment)	September 30, 2016
Construct and improve check dams in ditch along ramp to Camp Lake jetty	Site Services	October 30, 2016

7.0 SUMMARY AND RECOMMENDATIONS

This document presents the Sedimentation Mitigation Action Plan for the Mary River Project prepared in response to the FAD issued to Baffinland on June 7, 2016. The implementation schedule for each mitigation action is also presented herein. A requirement of the FAD was that Baffinland also prepare and submit a Dust Mitigation Action Plan; the action plans have been developed as separate deliverables consistent with the direction, but it is important to recognize that they are closely related to each other and will be synergistic when they are implemented together.

It is recommended that Baffinland complete all of the listed mitigation actions to reduce the impacts of sediment on the receiving environment. Specific attention is drawn to the following through the following recommendations:

- Procure and bring into use proper snow removal equipment, including 6-way blades and evaluate the use of commercial-sized snow blowers, when it is possible to transport the equipment to the site.
- Revise and implement snow management plans for each of the areas on the site prior to the onset of winter conditions in 2016. A stand-alone plan for each facility or an overall project site plan, with a section for each area, may be prepared.
- Develop and implement a road improvement earthworks plan for 2017 for the Tote Road. A significant amount of work, including culvert lengthening and replacement, road widening, rip rap placement, ditch upgrading, and road surfacing, is required to reduce sediment generation from the road. Proper scheduling to complete this work must be developed in consideration of seasonality constraints and to determine material and resource requirements. The implementation the upgrade design to satisfy the requirements of the *Mine Health and Safety Act* of Nunavut is required to be part of this work.
- Performance of regular inspections of the Tote Road and Mine Haul Road to identify conditions of concern and required maintenance work.

8.0 CLOSING

We trust this draft document provides the information you presently require. Should you have any comments or questions, please contact the undersigned.

9.0 STUDY LIMITATIONS

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Report Signature Page

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Principal, Senior Geotechnical Engineer

CDM/PMB/hp

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APPENDIX D.7.4
2016 INAC INSPECTION REPORTS
AND BAFFINLAND REPONSES

Indigenous and Northern Affairs Canada / Affaires autochtones et du Nord Canada

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Baffinland Iron Mines Corporation (BIMC)	Jim MILLARD/Allan KNIGHT
Licence No. / Expiry	**Representative's Title**
2AM-MRY1325	Environmental Manager
Land / Other Authorizations	**Land / Other Authorizations**
8BC-MRY1416, 2BE-MRY1421	N2014X0012, N2014Q0016, N2014C0013
Date of Inspection	**Inspector**
May 18-20, 2016	Justin HACK

Activities Inspected

☒ Camp ☐ Drilling ☒ Mining ☒ Construction ☐ Reclamation ☒ Fuel Storage
☒ Roads/Hauling ☐ Other: ☐ Other:

Conditions: **A - Acceptable** **C - Concern** **U - Unacceptable** **NA – Not Applicable** **NI – Not Inspected**

Water Use	Condition	Comment	Site Conditions	Condition	Comment	Haz/Mat Management	Condition	Comment
Intake/Screen	NI		Water Management Structures	U	1,2,4,8 10,11, 12	Storage	NI	
Flow Measure. Device	NI		Culverts / Bridges	U	7	Spills	NI	
Source:	A		Drainage	C	1,4	Spill Plan	A	
Water Use:	A		Erosion / Sediment	U	6,7			
Recirculation (y /n)	NA		Mitigation Measures	C	1,2,6,7	**Administrative**		
			Reclamation Activities	A		Records	NI	
			Materials Storage	C	13	Reports	A	
Waste Disposal			Signage	A		Plans	A	
Waste Water	A					Notifications	A	
Solid Waste	A		**Monitoring**			**Other**		
Hazardous Waste	A		Sample Collection / Analysis	NI		Follow-up from previous inspection	U	

**The number in the comments field will correspond with specific comments provided below.*

Samples taken by Inspector:	Location(s): (1) Sheardown Lake Tributary 1 before it enter Sheardown Lake, and (2) small Camp Lake tributary, downstream of exploration camp, before it enters Camp Lake
☒ Yes ☐ No	

SECTION 1 ☒ **Comments** ☐ **Non-Compliance with Act or Licence** ☐ **Action Required**

Inspectors Statement

On May 18-20, 2016, a water licence inspection was conducted at the Mary River Project, Qikiqtani Region, Nunavut. Sites inspected included the Mary River Mine Site, the Tote Road and related infrastructure, and the Milne Port area.

Weather Conditions on Site

The site remained largely snow covered at the time of the inspection; however, due to unusually warm weather freshet had just begun causing significant snowmelt to enter watercourses.

Summary of Report

At the time of inspection, the Licensee was undertaking activities related to the operation of an open-pit iron ore mine at the Milne Port (Milne Inlet), Mine site (Mary River), Tote Road. Most major construction activities have finished and BIMC is primarily mining ore and transporting it to Milne Port in preparation for open water season.

Prior to the Inspection, BIMC has reported high levels of suspended solids are entering watercourses. This has been reported to relevant parties through Spill Report #: 16-158, 16-176, 16-181.

During the inspection, it was evident that sediment entering watercourses was a concern. Water flowing within the water courses at Mary River and along the Tote Road was significantly discoloured, amplified by the effect of iron oxidation. While on site, it was observed that sediment entering water was a consequence of:

- Over winter dust accumulation on the snow from project activities (i.e. crushing ore and material, transporting material on the Tote Road, and storing material in stockpiles). Snow stained with red iron dust is evident throughout the site,
- snowmelt entering watercourses with dust entrained in the snow,
- run-off from the road surface,
- surface water management structures not fully implemented to proactively deal with freshet and manage erosion and sedimentation; and,
- recent and continued construction of infrastructure.

Due to the concerns of sediment entering watercourses, BIMC has committed to implementing a plan to address the sedimentation of watercourses around the site. This plan is to be provided to the Inspector by June 22 2016, and is to outline specific measures to be implemented within the 2016 season to effectively deal with sedimentation entering watercourses and to address freshet 2017.

SECTION 2 ☐ **Comments** ☐ **Non-Compliance with Act or Licence** ☒ **Action Required**

Water Management Structures:

1. Ore Stockpile Pad Diversion Ditches and Ore Stockpile Settling Ponds at Milne Inlet
    a. No snow was contained on the Ore Stockpile Pad; however, significant water was present within the facility.
    b. During this inspection it was noted that the ore stockpile diversion ditches and the ore stockpile settling ponds were still not completed.
    c. BIMC has not met the deadline they committed to in June 2016 whereas diversion ditches and the settling ponds would be properly commissioned prior to freshet 2016.
    d. *INAC* was not informed prior to freshet 2016 that this commitment would not be met.
    e. Following the inspection, BIMC has submitted a plan entitled, "*Milne Stockpile Pad Water Drainage System – Execution Plan and Schedule,*" whereas BIMC has again committed to completing this work prior to July 18, 2016.
2. Water Management Structures along the Tote Road
    a. In previous inspections, it was recommended that BIMC proactively identify areas that are more prone to silt-loading and implement appropriate sedimentation mitigation measures. The location near to David Lake, KM78 to KM86, was identified as a high risk area.
        i. Specifically, BIMC committed to installing armour stone in ditches that receive high levels of flow prior to Freshet 2016.
        ii. At the time of the inspection, appropriate sedimentation mitigation measures were not installed in areas of high risk.
        iii. *INAC* was not informed prior to freshet 2016 that this commitment would not be met.
        iv. BIMC has committed to developing a plan with timelines and measureable deliverable to address their erosion prevention measures on the Tote Road prior to June 22, 2016.
3. Water Management Structures along the Mine Haul Road
    a. BIMC has completed significant work, since the last inspection on the Mine Haul Road, to deal with erosion and sedimentation.
        i. Ditches along this road were armoured with rip-rap.
        ii. Water was being effectively diverted into these ditches and then into small sedimentation ponds before entering culverts.
        iii. Armouring stone was installed downstream of culverts to reduce sedimentation and erosion.
    b. Water accumulating on the road was being diverted to temporary road drainage structures.
4. Ore Crushing Area and associated Sedimentation Ponds
    a. In the previous inspection, there were concerns with the erosion protection deficiencies along the natural drainage edge of this facility as well as minor tear/punctures in the liner.
        i. It was observed during the inspection that the previous concerns noted have been addressed. Rip-rap has been installed along the natural drainage edge and minor punctures have been repaired.
    b. During this inspection, water was pooling in the ore crushing area.
    c. Prior to the inspection, a sinkhole formed within the facility likely from excess water accumulation.
    d. It is recommended that BIMC grade the ore crushing area to properly drain the facility towards the sedimentation ponds.
5. Waste Rock Pile water collection pond
    a. At the time of the inspection, the waste rock pile water collection pond was currently being commissioned.
    b. Interceptor ditches not yet completed.
    c. No major concerns with this structure.

Sedimentation:

6. During the inspection, there were significant sedimentation and erosion events (as indicated by red rust coloured water) actively occurring within watercourses along the Tote Road and entering David Lake, Mural Lake, Kabikok Lake, Sheardown Lake (see *Photo 1*), Camp Lake (*see Photo 2*), Mary River and Phillips Creek.
    a. The cause of this sedimentation and erosion events is likely loose soils becoming suspended during higher flow events, run-off of water from the Tote Road, and from dust entrained within snow (resulting the crusher, the tote road and the ore stockpile) melting and entering the watercourses.
    b. During freshet it was observed that BIMC prioritized sedimentation control measures in certain streams; however, the extent of the sedimentation event was too large to control with reactionary measures.
    c. Significant pre-planned sedimentation control measures prior to sedimentation events are likely required to meet conditions of the Water Licence.

   d. Water samples were taken by the Inspector to confirm water quality at Sheardown Lake Tributary 1, and a small tributary entering Camp Lake.
      i. The water quality sample at Sheardown Lake Tributary 1 had a Total Suspended Solid (TSS) result of 50.4mg/L. This level is within the Effluent Quality Limits for Surface Runoff during the Construction phase as construction was occurring directly upstream of this sample location.
      ii. The water quality sample taken at the stream entering Camp Lake near the monitoring location MS-MRY-1 had a TSS result of 114mg/L. This sample exceeded all effluent quality limits within the licence.
      iii. **A letter of Non-Compliance has been issued as a warning to BIMC because previous commitments were not addressed to mitigate the effects of sediment loading to water.**

7. Bridges along Tote Road
   a. During wet conditions on the Tote Road, it was noted that road material is being pushed into all water courses that are crossed by a bridge.
   b. During the inspection, there was significant sediment on snow below the bridge (see *Photo 3*).
   c. It is requested that BIMC address this concern in their plan due June 22, 2016 which is to address sedimentation issues along the Tote Road.

<u>Sites of Concern noted from Previous Inspections:</u>

Water Management Structures:

Mine Site

8. Jetty at Camp Lake
   a. Significant erosion has occurred at the Jetty at Camp Lake. Further erosion and sedimentation is likely to occur if this issue is not addressed.
   b. BIMC has provided a schedule and plan on timelines to address this concern:
      i. In Late June 2016: install silt curtains around the facility.
      ii. In July 2016: complete work on the structure.
9. Jet Fuel Tank Farm Containment at Aerodrome
   a. During a previous inspection, it was noted that the crest and profile of the embankments were not maintained.
   b. During the May 2016 inspection the berms/ embankments appeared to be well maintained.
10. Bulk Fuel Storage Facility Containment.
   a. The embankment crest and some side slopes were not maintained to the design profile as required.
   b. During the May 2016 inspection this structure was not inspected, INAC will follow up in the next inspection.
11. Hazardous Waste Containment
   a. During a previous inspection, it was noted that the crest width and profiles of some of these facilities near the aerodrome were not in good shape. There were indications of manoeuvring of tracked machinery over the embankment resulting in a disturbed embankment profile. It is recommended these containments receive maintenance.
   b. During the May 2016 inspection this structure was not inspected, INAC will follow up in the next inspection.

Milne Port Site

12. Hazardous Waste Containment Facility
   a. During a previous inspection, it was noted that some of the berm crest widths and profiles were not in good shape and there were indications or manoeuvring of tracked machinery over the berms.
   b. It is suggested that these containments be sign-posted warning of the shallow cover material thickness over the liner limiting traffic movements and caution when placing heavy, sharp, or other large objects which may have the potential to puncture the liner.
   c. BIMC has addressed this and said consideration is being given to the strategic installation of barriers and/or signs.
   d. During the May 2016 inspection this structure was not inspected, INAC will follow up in the next inspection.

Materials Storage:

13. Calcium Chloride Storage Area
   a. It is recommended that a perimeter berm/drainage ditch be installed to route the runoff away from the storage and down the slope hill to the drainage ditch along the Tote Road as a preventative measure.
   b. BIMC has committed to visual monitoring and flow mapping of the area during Freshet 2016 and that drainage measures will be implemented as appropriate.
   c. During the May 2016 inspection this structure was not inspected, INAC will follow up in the next inspection.

Waste Water:

14. Accumulated Water at the new maintenance building at KM60 on the Tote Road
    a. During a previous inspection concern was expressed on how BIMC would deal with accumulated wastewater within this facility.
    b. BIMC has provided justification that water will not accumulate within this facility or migrate from this facility. BIMC has committed to monitor this structure.

Inspector's Name	
Justin Hack	
Signature	
[signature]	
Date	
June 16, 2016	

Justin Hack
Water Resource Officer
Iqaluit, NU
PH: 867-975-4517
Email: Justin.hack@aandc.gc.ca

Photo Log # 1 **Location: Sheardown Lake Tributary #1**

Description: Water laden with sediment entering Sheardown Lake

Photo Log # 2	Location: Camp Lake near Water Intake

Description: Sedimentation entering Camp Lake from small camp lake tributary downstream of exploration camp

Photo Log # 2	Location KM62 Bridge

Description: Road material entering stream at KM62 Bridge

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	**Licensee Representative**
Baffinland Iron Mines Corporation (BIMC)	Jim MILLARD/Allan KNIGHT
Licence No. / Expiry	**Representative's Title**
2AM-MRY1325	Environmental Manager
Land / Other Authorizations	**Land / Other Authorizations**
2BE-MRY1421	N2014X0012, N2014Q0016, N2014C0013
Date of Inspection	**Inspector**
July 6-8, 2016	Justin HACK

Activities Inspected

☒ Camp ☐ Drilling ☒ Mining ☒ Construction ☐ Reclamation ☒ Fuel Storage
☒ Roads/Hauling ☐ Other: ☐ Other:

Conditions: **A - Acceptable** **C - Concern** **U - Unacceptable** **NA – Not Applicable** **NI – Not Inspected**

Water Use	Condition	Comment	Site Conditions	Condition	Comment	Haz/Mat Management	Condition	Comment
Intake/Screen	NI		Water Management Structures	C	1-3,7-10	Storage	NI	
Flow Measure. Device	NI		Culverts / Bridges	A	4-5	Spills	NI	
Source:	A		Drainage	A		Spill Plan	A	
Water Use:	A		Erosion / Sediment	A				
Recirculation (y /n)	NA		Mitigation Measures	A		**Administrative**		
			Reclamation Activities	A		Records	NI	
			Materials Storage	A	6, 11	Reports	A	
Waste Disposal			Signage	A		Plans	A	
Waste Water	A					Notifications	A	
Solid Waste	A		**Monitoring**			**Other**		
Hazardous Waste	A		Sample Collection / Analysis	NI		Follow-up from previous inspection	A	

**The number in the comments field will correspond with specific comments provided below.*

Samples taken by Inspector: ☐ Yes ☒ No	Location(s):

SECTION 1 ☒ **Comments** ☐ **Non-Compliance with Act or Licence** ☐ **Action Required**

Inspectors Statement

On July 6-8 2016, a water licence inspection was conducted at the Mary River Project, Qikiqtani Region, Nunavut. Sites inspected included the Mary River Mine Site, the Tote Road and related infrastructure, and the Milne Port area.

Weather Conditions on Site

Temperatures of approximately 20°C, partially cloudy and no snow remained on site.

Summary of Report

At the time of inspection, the Licensee was undertaking activities related to the operation of an open-pit iron ore mine at the Milne Port (Milne Inlet), Mine site (Mary River), Tote Road. Most major construction activities have finished and BIMC is primarily mining ore and transporting it to Milne Port in preparation for ore transportation.

During the Water Licence Inspection in May 2016, it was observed that commitments made by BIMC to complete the Ore Stockpile Pad Diversion Ditches and commitments to address areas prone to sedimentation along the Tote Road were not met. A Letter of Non-Compliance was issued to BIMC outlining deadlines to complete this work and a warning that further enforcement measures may be taken if reasonable diligence towards meeting the requirement of their licence, Part D, are not addressed.

Since the May inspection, significant work has been completed related to addressing the sedimentation issues around site and completing the Ore Stockpile Diversion ditches. BIMC has committed, until the submission of the Tote Road and Mine Haul Road Mitigation Action Plan on September 30, 2016 to submit bi-weekly updates regarding work related to this concern.

SECTION 2 ☐ **Comments** ☐ **Non-Compliance with Act or Licence** ☒ **Action Required**

Water Management Structures:

1. Waste Rock Pile Sedimentation Pond
   a. At the time of the inspection, it was observed that run-off at the Waste Rock Pile Sedimentation pond was not being properly diverted to the sedimentation pond.
   b. BIMC committed to addressing the surface water run-off concern of this facility by July 22, 2016.

   c. Follow-up will be completed at the next inspection.
2. Ore Stockpile Pad Diversion Ditches and Ore Stockpile Settling Ponds at Milne Inlet
   a. A Letter of Non-Compliance was issued regarding the commitments not achieved after the May 2016 Inspection.
   b. In a response provided to the Inspector prior to this inspection, BIMC has submitted a plan entitled, "*Milne Stockpile Pad Water Drainage System – Execution Plan and Schedule*" whereas work was planned to be completed by June 22, 2016.
   c. Completed work was confirmed to have occurred on this structure during the inspection.
3. Water Management Structures along the Tote Road
   a. Due to the significant sedimentation of waterways around the project, a *Letter of Non-Compliance* was issued to BIMC to address this issue.
   b. In response to the Letter of Non-Compliance, BIMC has made significant progress related to mitigating sedimentation events from project activities.
   c. Updates are being provided by BIMC in bi-weekly reports of any new work associated with addressing and mitigating sedimentation of waterways along the Tote Road.
   d. On September 30, 2016 a Tote Road and Mine Haul Road mitigation action plan is due to Environment and Climate Change Canada that will provide an implementation schedule addressing sediment water runoff from the road into culverts, ditchers, and creeks/streams which leads to David Lake, Mural Lake, Kabikok Lake, KM32 Lake, KM27 Lake, Camp Lake, Sheardown Lake, Mary River, and Phillips Creek.

Culverts/Bridges

4. Bridges along Tote Road
   a. In a previous inspection it was noted that road material was being pushed into water courses that are crossed by a bridge.
   b. In the report submitted June 24, 2016 BIMC provided documentation that this issue was addressed.
5. Culverts
   a. Previous concerns related to culverts management and maintenance is being addressed in the Tote Road and Mine Haul Road mitigation action plan due September 30, 2016.

Materials Storage

6. Ore Crushing Area and associated Sedimentation Ponds
   a. This structure was previously identified by BIMC as encroaching onto a nearby stream.
      i. At the time of this inspection, BIMC was conducting work to remove a section of the ore crushing area pad away from the stream.
      ii. Significant erosion and sedimentation control measures were in place during this activity.
   b. Another concern that was noted in a previous inspection was the drainage of the facility.
      i. BIMC has installed culverts and graded the facility to help channel water to the sedimentation pond.

<u>Sites of Concern noted from Previous Inspections:</u>

Water Management Structures:

Mine Site

7. Jetty at Camp Lake
   a. Silt curtain were installed in July to prevent further damage to the structure.
   b. On August 23, 2016 BIMC provided notice that there have been delays in making the required repairs to the jetty due to logistical problems.
   c. BIMC has committed to finalizing the work before freeze-up.
8. Bulk Fuel Storage Facility Containment.
   a. The embankment crest and some side slopes were not maintained to the design profile as required.
   b. During the July 2016 inspection the berms/embankments appeared to be well maintained.
9. Hazardous Waste Containment
   a. During a previous inspection, it was noted that the crest width and profiles of some of these facilities near the aerodrome were not in good shape. There were indications of manoeuvring of tracked machinery over the embankment resulting in a disturbed embankment profile. It is recommended these containments receive maintenance.
   b. During the July 2016 inspection the berms/embankments appeared to be well maintained.

Milne Port Site

10. Hazardous Waste Containment Facility
   a. During a previous inspection, it was noted that some of the berm crest widths and profiles were not in good shape and there were indications or manoeuvring of tracked machinery over the berms.
   b. During the May 2016 inspection this structure was not inspected.
   c. During the July 2016 inspection it was noted that there was evidence of water within the facility close to overtopping at the spillway.

d. Sufficient freeboard must be maintained at this facility.

Materials Storage:

11. Calcium Chloride Storage Area
    a. It is recommended that a perimeter berm/drainage ditch be installed to route the runoff away from the storage and down the slope hill to the drainage ditch along the Tote Road as a preventative measure.
    b. BIMC has committed to visual monitoring and flow mapping of the area during Freshet 2016 and that drainage measures will be implemented as appropriate.
    c. This facility was inspected and no concerns were noted.

Inspector's Name	
Justin Hack	
Signature	
[signature]	
Date	
September 13, 2016	

Justin Hack
Water Resource Officer
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Indigenous and Northern Affairs Canada | Affaires autochtones et du Nord Canada

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Baffinland Iron Mines Corporation (BIMC)	Jim MILLARD/William BOWDEN
Licence No. / Expiry	**Representative's Title**
2AM-MRY1325	Environmental Manager
Land / Other Authorizations	**Land / Other Authorizations**
2BE-MRY1421	N2014X0012, N2014Q0016, N2014C0013
Date of Inspection	**Inspector**
Sept 28-29, 2016	Justin HACK

Activities Inspected

☒ Camp ☐ Drilling ☒ Mining ☒ Construction ☐ Reclamation ☒ Fuel Storage
☒ Roads/Hauling ☐ Other: ☐ Other:

Conditions: **A - Acceptable** **C - Concern** **U - Unacceptable** **NA – Not Applicable** **NI – Not Inspected**

Water Use	Condition	Comment	Site Conditions	Condition	Comment	Haz/Mat Management	Condition	Comment
Intake/Screen	NI		**Water Management Structures**	**C**	**5**	Storage	NI	
Flow Measure. Device	A		Culverts / Bridges	A		Spills	NI	
Source:	A		Drainage	A		Spill Plan	A	
Water Use:	A		**Erosion / Sediment**	**A**	**16**			
Recirculation (y /n)	NA		Mitigation Measures	A		**Administrative**		
			Reclamation Activities	A		Records	NI	
			Materials Storage	A		Reports	A	
Waste Disposal			Signage	A		Plans	A	
Waste Water	A					Notifications	A	
Solid Waste	A		**Monitoring**			**Other**		
Hazardous Waste	A		Sample Collection / Analysis	NI		Follow-up from previous inspection	A	

**The number in the comments field will correspond with specific comments provided below.*

Samples taken by Inspector:	Location(s):
☐ Yes ☒ No	

SECTION 1 ☒ **Comments** ☐ **Non-Compliance with Act or Licence** ☐ **Action Required**

Inspectors Statement

On September 28-29 2016, a water licence inspection was conducted at the Mary River Project, Qikiqtani Region, Nunavut. Sites inspected included the Mary River Mine Site, the Tote Road and related infrastructure, and the Milne Port area.

Weather Conditions on Site

Temperatures were approximately -2°C with snow cover. Large water bodies remained unfrozen, while smaller streams and water in containment was frozen.

Summary of Report

At the time of inspection, the Licensee was conducting activities related to the mining of iron ore, which includes blasting, crushing and transporting ore to Milne Port to an awaiting ship.

Due to the significant snow cover on site and the frozen conditions it was difficult to conduct a thorough inspection. All major activities related to the use of water and deposits of waste were inspected.

Baffinland has submitted a Dust Mitigation Action Plan and a Sedimentation Mitigation Action Plan to address the ongoing concerns with dust, sedimentation and erosion on site.

No major concerns are noted in this report

SECTION 2 ☐ **Comments** ☐ **Non-Compliance with Act or Licence** ☒ **Action Required**

Water Management Structures:

1. Waste Rock Pile Sedimentation Pond and Surface Water Management Ditches
   a. BIMC explained that proper diversion ditches for this facility were constructed as noted in a previous inspection.
   b. During inspection, snow cover prevented proper inspection of this facility.
   c. Follow-up will be conducted when snow melts.
2. Crusher Pad Construction

a. A recent expansion of this facility was completed.
b. It was noted previously that BIMC had installed mitigation measures to address sedimentation during construction.
c. At the time of this inspection, BIMC left the mitigation measures in place to address possible sedimentation during spring melt.

3. Crusher Pad Sedimentation Pond
    a. Significant snow cover prevented proper inspection of this facility; however, no signs of leaks were apparent.
4. Ore Stockpile Sedimentation Pond West
    a. During the Jul 2016 Geotechnical Inspection, it was identified that there is concern over the stability of the liner in this pond.
    b. Furthermore, culvert inlet is possibly allowing water to flow under the liner. This must be repaired during the next construction season.
5. Ore Stockpile Sedimentation Pond East
    a. At the time of the inspection, the water within the pond was approximately 30cm from overtopping. It was recommended to BIMC that this pond be decanted to prevent uncontrolled discharge from this facility.
6. Hazardous Waste Berms (MS-HWB1 to 6, and MP-HWB-1, MP-HWB-3 to 5)
    a. All hazardous waste berms were inspected.
    b. All waste was contained within the facility and no signs of leaks were apparent.
7. Polishing Waste Stabilization Ponds (Three Ponds at Mary River and One Pond at Milne Port)
    a. Significant snow cover prevented a proper inspection; however, no signs of leaks in the berm walls or tears in the liner were apparent.
8. Ore Stockpile Pad Diversion Ditches
    a. No concerns related to this infrastructure.
9. Contaminated Snow Containment Facility
    a. Significant snow cover prevented proper inspection of this facility; however, no signs of leaks were apparent.
10. Landfarm Facility
    a. Significant snow cover prevented proper inspection of this facility; however, no signs of leaks were apparent.
11. Bulk Fuel Storage Facility at Mine Site, Aerodrome, and Milne Port
    a. No concerns with these structures.

Water Use:

12. Records for water use were in good order at the time of the inspection at both Milne Port and Mary River Mine Site.
13. At the time of the inspection, water was primarily being used to support camp functions.

Waste Discharges:

14. BIMC was discharging sewage waste as intended. No other discharges of wastes were occurring during the inspection.
15. Records of sewage discharges were in good order.

Erosion and Sedimentation

16. General Site Comment
    a. Due to the significant sedimentation of waterways around the project, a *Letter of Non-Compliance* was issued to BIMC to address this issue.
    b. In response to the Letter of Non-Compliance, BIMC has made significant progress related to mitigating sedimentation events from project activities.
    c. On September 30, 2016 a Dust Mitigation Action Plan and a Sedimentation Mitigation Action Plan was submitted by BIMC to address the concerns over Dust and Sedimentation on site.
17. Jetty at Camp Lake
    a. The construction of this structure was complete at the time of the inspection.
    b. Proper sedimentation measures were installed during construction.

Culverts/Bridges

18. Bridges along Tote Road
    a. In a previous inspection it was noted that road material was being pushed into water courses that are crossed by a bridge.
    b. BIMC has developed a plan to minimize the amount of road material entering major water courses.
    c. This will be monitored during future inspections.

Inspector's Name	

Justin Hack	
Signature	
Date	
November 9, 2016	

Justin Hack
Water Resource Officer
Iqaluit, NU
PH: 867-975-4517
Email: Justin.hack@aandc.gc.ca

Baffinland

November 14, 2016

Justin Hack, Resource Management Officer
Nunavut Field Operations
Indigenous and Northern Affairs Canada
Iqaluit, NU X0A 0H0

Re: Response to INAC June, July, and September 2016 Inspection Findings for Mary River Project, Type A Water Licence 2AM-MRY1325 Amendment No.1, Type B Water Licence 2BE-MRY1421, and Land Use Permits N2014X0012, N2014Q0016, N2014C0013
Dear Mr. Hack:

This letter provides Baffinland Iron Mines Corporation's (Baffinland) response to Indigenous and Northern Affairs Canada (INAC) Inspections that were conducted on the following dates under the above referenced Water Licences and Land Use Permits: May 18 to 20, July 6 to 8, and September 28 to 29.

We attach Tables A.1, A.2, and A.3 which provide Baffinland's responses to concerns and comments provided in the Inspection Reports received by Baffinland on June 16, September 13, and November 9, 2016, respectively.

Please do not hesitate to contact us should you have any further comments or questions.

Sincerely,

James Millard
Environmental Manager

Attach:

- Table A.1 - Baffinland Response to INAC Water Licence Inspection Report, Dated June 16, 2016 (four pages)
- Table A.2 - Baffinland Response to INAC Water Licence Inspection Report, Dated September 13, 2016 (three pages)
- Table A.3 - Baffinland Response to INAC Water Licence Report Dated November 9, 2016 (three pages)
- INAC Inspection Reports (11 pages)

Cc: Erik Allain, Scott Burges, Sarah Forte, Jonathan Mesher (INAC)
Todd Burlingame, Wayne McPhee, Sylvain Proulx, Robert Gagne (Baffinland)

Baffinland Iron Mines Corporation
Suite 300, 120 2275 Upper Middle Road East, Oakville Ontario, Canada, L6H 0C3
Tel: +1 (416) 364-8820
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Table A.1 - Baffinland Response to INAC Water Licence Inspection Report, Dated June 16, 2016 (Inspection Dates May 18 to May 20)

ITEM No.[1]	Observation or Item of Concern	Baffinland Responses
Waste Management Structures:		
1	***Ore Stockpile Pad Diversion Ditches and Ore Stockpile Settling Ponds at Milne Inlet*** *- significant water within the Ore Stockpile Pad* *- diversion ditches and the ore stockpile settling pond still not completed* *- not met the deadline committed to in June 2015 whereas the diversion ditches and the settling ponds would be properly commissioned prior to freshet 2016* *- INAC was not informed prior to freshet 2016 that this commitment would not be met*	Following the inspection, BIMC submitted a plan entitled, "*Milne Stockpile Drainage System - Execution Plan and Schedule* " (May 23, 2016). The construction of the diversion ditches commenced in late May and was substantially completed in mid-June.
2	***Water Management Structures along the Tote Road*** *- BIMC committed to installing armour stone in ditches that receive high levels of flow, specifically location near David Lake, Km78 to Km86, prior to freshet 2016.* *- Appropriate sedimentation mitigation measures were not installed in areas of high risk* *- INAC was not informed prior to freshet 2016 that this commitment would not been met*	Following the inspection, BIMC retained OPC North in late May to manage the implementation of sedimentation mitigation measures along the Tote Road, including check dam construction, roadside ditch armouring using rip-rap and geotextile, silt fence installation and the reinforcement of erosion prone slopes. The majority of the work was completed between km 77 - 100 of the Tote Road and focused on the concerns identified during the May inspection. Additional details are provided in the biweekly update reports and completion report provided to Environment and Climate Change Canada (ECCC) and INAC in response to the Fisheries Act Direction and INAC Letter of Non-Compliance. Moreover, as part of the Sedimentation Mitigation Plan submitted to ECCC and INAC on September 29, 2016, BIMC is currently finalizing a Tote Road Earthworks Execution Plan (TREEP) to address outstanding concerns along the Tote Road. The TREEP will outline timelines and measurable deliverables and will discuss the planned road upgrades and sedimentation mitigation measures to be completed along the Tote Road in the future.
4	***Ore Crushing Area and associated Sedimentation Ponds*** *- water pooling in the ore crushing area* *- sinkhole formed within the facility likely from excess water accumulation* *- recommend that BIMC grade the ore crushing area to properly drain the facility towards the sedimentation ponds*	During early July, the Mine Site Crusher Pad was recontoured to optimize surface water drainage on the pad. Moreover, in accordance with the facility design intent a perimeter ditch was completed around the crusher pad to redirect runoff to the crusher pad sedimentation pond.
5	***Waste Rock Pile water collection pond*** *- waste rock pile water collection pond currently being commissioned* *- intercept ditches not yet completed* *- No major concerns with this structure*	The Waste Rock Settling Pond was completed in May 2016. Modifications were made to the ditching and diversion structures throughout the summer to ensure effective direction of surface water drainage. Nuna East was contracted to recontour and modify the water management infrastructure (sedimentation pond, drainage ditching, diversion berms) associated with the waste rock stockpile and pond. These modifications were effective in directing most runoff originating from the waste rock stockpile to the sedimentation pond.

Sedimentation:		
6	***Significant sedimentation and erosion events during the inspection*** *- indicated by red rust coloured water actively occurring within water courses along the Tote Road and entering David Lake, Murial Lake, Katiktok Lake, Sheardown Lake, Camp Lake, Mary River and Phillip's Creek.* *- likely caused by loose soils becoming suspended during higher flow events, runoff of water from the Tote Road, and from dust entrained within snow melting and entering watercourses.* *- during freshet it was observed sedimentation control measures prioritized in certain streams; however, the extent of the sedimentation event was too large to control with reactionary measures.* *- significant pre-planned sedimentation control measures prior to sedimentation events are likely required to meet conditions of the Water Licence.* *- Water samples taken by the Inspector at Sheardown Lake Tributary 1 had a TSS result of 50.4 mg/L. - within the Effluent Quality Limits for Surface Runoff.* *- Water sample taken at the stream entering Camp Lake had a result of 114 mg/L - exceeded effluent quality limits within the licence.* *- A letter of Non-Compliance has been issued as a warning to BIMC because previous commitments were not addressed to mitigate the effects of sediment loading to water.*	Refer to the biweekly update reports and completion report submitted by BIMC to Environment and Climate Change Canada and INAC in response to the Fisheries Act Direction and INAC Letter of Non-Compliance.
7	***Bridges along the Tote Road*** *- during wet conditions on the Tote Road, it was noted that road material is being pushed into all water courses that are crossed by a bridge.* *- during the inspection, there was significant sediment on the snow below the bridges.* *- it is requested this concern be addressed in the plan due June 22, 2016 which is to address sedimentation issues along the Tote Road.*	Following the inspection, attempts were made to clear snow under the bridges along the Tote Road, and the surface of the bridges were cleared of muddy material by means of manual methods. Additional details are provided in the biweekly update reports and completion report provided to Environment and Climate Change Canada (ECCC) and INAC in response to the Fisheries Act Direction and INAC Letter of Non-Compliance. Material is not be deliberately pushed into the water, rather material that falls off the trucks and other equipment drops through gaps in the bridge. The issue was addressed in so far as road materials that fell on the ice below the bridges were scraped up prior to freshet. The design of each bridge is such that some road material will fall through the gaps, however, the gaps are an integral design feature of the bridges. More study of this design challenge is required. Baffinland will keep you notified of our work in this regard.

Sites of Concern from Previous Inspections		
Water Management Structures:		
Mine Site		
8	***Jetty at Camp Lake*** *- Significant erosion has occurred at the Jetty at Camp Lake. Further erosion and sedimentation is likely to occur it the issue is not addressed.* *- BIMC has provided a schedule and plan on timelines to address this concern:* *- In Late June: install silt curtains around the facility* *- In July 2016: complete work on the structure.*	Silt curtains were installed around the perimeter of the Camp Lake Water Jetty during mid-July. In mid-September, the jetty was repaired and armoured along its perimeter in order to prevent similar erosion events from occurring in the future.
9	***Jet Fuel Tank Farm Containment at Aerodrome*** *- During a previous inspection, it was noted that the crest and embankments were not maintained.* *- During the May 2016 inspection the berms and embankments appeared to be well maintained.*	Noted.
10	***Bulk Fuel Storage Facility Containment*** *- The embankment crest and some side slopes were not maintained to the design profile as required* *- During the May 2016 inspection this structure was not inspected, INAC will follow up in the next inspection*	The embankment crest and slide slopes of the Mine Site Bulk Fuel Storage Facility have been recontoured to reflect the design profile.
11	***Hazardous Waste Containment*** *- During a previous inspection, it was noted that the crest width and profiles of some of these facilities near the aerodrome were not In good shape. There were indications of maneuvering of tracked machinery over the embankments resulting in a disturbed embankment profile. It is recommended these containments receive maintenance* *- During the May 2016 inspection this structure was not inspected, INAC will follow up in the next inspection.*	The issue has been brought up by supervisors to their team members and the berms are monitored to ensure no further disturbance. In some cases, barriers and signs have been posted. The berm walls have been recontoured to reflect the berm design profiles.
Milne Port Site		
12	***Hazardous Waste Containment Facility*** *- During a previous inspection, it was noted that some of the berm crest widths and profiles were not In good shape and there were indications of maneuvering of tracked machinery over the berms.* *-It is suggested that these containments be sign-posted warning of the shallow cover material thickness over the liner limiting traffic movements and caution when placing heavy, sharp, or other large objects which may have the potential to puncture the liner.* *- During the May 2016 inspection this structure was not inspected, INAC will follow up in the next inspection.*	The issue has been brought up by supervisors to their team members. BIMC will continue to monitor the berms to ensure no further disturbance. In some cases, barriers and signs have been posted. The berm walls have been recontoured to reflect the berm design profiles.
Materials Storage:		

13	***Calcium Chloride Storage Area*** *-It is recommended that a perimeter berm / drainage ditch be installed to route runoff away from the storage and down the slope hill to the drainage ditch along the Tote Road as a preventative measure.* *- BIMC has committed to visual monitoring and flow mapping of the area during freshet 2016 and that drainage measures will be implemented where appropriate.* *- During the May 2016 inspection this structure was not inspected, INAC will follow up in the next inspection.*	No runoff or water flow was observed at this location during 2016. BIMC will continue to monitor the area for runoff and will implement drainage measures where required.
Waste Water:		
14	***Accumulated water at the new maintenance building at KM60 on the Tote Road*** *- During a previous inspection, concern was expressed on how BIMC would deal with accumulated wastewater within this facility.* *- BIMC has provided justification that water will not accumulate within this facility or migrate from this facility. BIMC has committed to monitor this structure.*	During 2016, no significant water accumulation was observed within this structure. BIMC will continue to monitor this structure for surface water drainage.

Notes:

[1] Item No. as referenced in AANDC Water Licence Inspection Report May 18-20, 2016

Table A.2 - Baffinland Response to INAC Water Licence Inspection Report, Dated September 13, 2016 (Inspection Dates July 6 to 8)		
ITEM No.[1]	Observation or Item of Concern	Baffinland Responses
Water Management Structures		
1	***Waste Rock Pile Sedimentation Pond*** *- Runoff at the Waste Rock Pile was not being properly diverted to the sedimentation pond* *- BIMC committed to addressing the surface water runoff concern of this facility by July 22, 2016* *- Follow-up will be completed at the next inspection*	The Waste Rock Settling Pond was excluding the ditching, was completed in May 2016. Modifications were made to the ditching and diversion structures throughout the summer to ensure effective direction of surface water drainage. Nuna East was contracted to recontour and modify the water management infrastructure (sedimentation pond, drainage ditching, diversion berms) associated with the waste rock stockpile and pond. These modifications were effective in directing most runoff originating from the waste rock stockpile to the sedimentation pond.
2	***Ore Stockpile Diversion Ditches and Ore Stockpile Settling Ponds at Milne Inlet*** *- A Letter of Non-Compliance was issued regarding the commitments not achieved after the May 2016 Inspection* *- In a response provided to the Inspector prior to this inspection, BIMC has submitted a plan entitled, "Milne Stockpile Pad Water Drainage System – Execution Plan and Schedule" whereas work was planned to be completed by June 22, 2016.* *- Completed work was confirmed to have occurred on this structure during the inspection*	Noted.
3	***Water Management Structures along the Tote Road*** *- Due to the significant sedimentation of waterways around the project, a Letter of Non-Compliance was issued to BIMC to address this issue.* *- In response to the Letter of Non-Compliance, BIMC has made significant progress related to mitigating sedimentation events from project activities.* *- Updates are being provided by BIMC in bi-weekly reports of any new work associated with addressing and mitigating sedimentation of waterways along the Tote Road.* *- On September 30, 2016 a Tote Road and Mine Haul Road mitigation action plan is due to Environment and Climate Change Canada that will provide an implementation schedule addressing sediment water runoff from the road into culverts, ditches, and creeks/streams which leads to David Lake, Mural Lake, Kabikok Lake, KM32 Lake, KM27 Lake, Camp Lake, Sheardown Lake, Mary River, and Phillips Creek.*	On September 29th, 2016, BIMC submitted the Completion Report to Environment and Climate Change Canada and INAC in response to the Fisheries Act Direction and INAC Letter of Non-Compliance. Included in the Completion Report was the Sedimentation Mitigation Action Plan which outlines sedimentation mitigation measures to be taken at the Mary River Project, including the Tote Road and Mine Haul Road. As part of the Sedimentation Mitigation Action Plan, BIMC is currently finalizing a Tote Road Earthworks Execution Plan (TREEP) to address outstanding concerns (culverts, embankment erosion, etc.) along the Tote Road. The TREEP will outline timelines and measurable deliverables and will discuss the planned road upgrades and sedimentation mitigation measures to be completed along the Tote Road in the future.
Culverts/Bridges		
4	***Bridges along Tote Road*** *- In a previous inspection it was noted that road material was being pushed into water courses that are crossed by a bridge.* *- In the report submitted June 24, 2016 BIMC provided documentation that this issue was addressed.*	Noted. Material is not be deliberately pushed into the water, rather material that falls off the trucks and other equipment drops through gaps in the bridge. The issue was addressed in so far as materials that fell on the ice below the bridges were scraped up prior to freshet. The design of each bridge is such that some road material will fall through the gaps, however, the gaps are an integral design feature of the bridges. More study of this design challenge is required. Baffinland will keep you notified of our work in this regard.

5	***Culverts*** *- Previous concerns related to culverts management and maintenance is being addressed in the Tote Road and Mine Haul Road mitigation action plan due September 30, 2016.*	See response to Item 3.
Materials Storage		
6	**Ore Crushing Area and associated Sedimentation Ponds** **a.** *This structure was previously identified by BIMC as encroaching onto a nearby stream.* *- at the time of this inspection, BIMC was conducting work to remove a section of the ore crushing area pad away from the stream.* *- significant erosion and sedimentation control measures were in place during this activity.* ***b.*** *Another concern that was noted in a previous inspection was the drainage of the facility.* *- BIMC has installed culverts and graded the facility to help channel water to the sedimentation pond.*	During early July, the Mine Site Crusher Pad was recontoured to optimize surface water drainage on the pad. Moreover, in accordance with the facility design intent a perimeter ditch was extended around the crusher pad to intercept and redirect runoff to the crusher pad sedimentation pond.
Sites of Concern from Previous Inspections		
Water Management Structures:		
Mine Site		
7	***Jetty at Camp Lake*** *- Silt curtain were installed in July to prevent further damage to the structure.* *- On August 23, 2016 BIMC provided notice that there have been delays in making the required repairs to the jetty due to logistical problems.* *- BIMC has committed to finalizing the work before freeze-up.*	Silt curtains were installed around the perimeter of the Camp Lake Jetty during mid-July. In mid-September, the jetty was repaired and armoured along its perimeter in order to prevent similar erosion events from occurring in the future. All work was completed prior to freeze-up.
8	***Bulk Fuel Storage Facility Containment*** *- The embankment crest and some side slopes were not maintained to the design profile as required.* *- During the July 2016 inspection the berms/embankments appeared to be well maintained.*	Noted.
9	***Hazardous Waste Containment*** *- During a previous inspection, it was noted that the crest width and profiles of some of these facilities near the aerodrome were not in good shape. There were indications of manoeuvring of tracked machinery over the embankment resulting in a disturbed embankment profile. It is recommended these containments receive maintenance.* *- During the July 2016 inspection the berms/embankments appeared to be well maintained.*	Noted.
Milne Port Site		

10	***Hazardous Waste Containment Facility*** *- During a previous inspection, it was noted that some of the berm crest widths and profiles were not in good shape and there were indications or manoeuvring of tracked machinery over the berms.* *- During the May 2016 inspection this structure was not inspected.* *- During the July 2016 inspection it was noted that there was evidence of water within the facility close to overtopping at the spillway. Sufficient freeboard must be maintained at this facility.*	Following the inspection, the contaminated water contained in Hazardous Waste Berm MP-HWB-1 was transferred to the Milne Port Contaminated Snow Storage Berm for treatment. Water contained within the Contaminated Snow Storage Berm was treated using the onsite oily water treatment plant and discharged to the receiving environment during late August 2016. Effluent discharged to the receiving environment met the water quality criteria outlined in the Type A Water Licence (2AM-MRY1325). Prior to freeze-up, Hazardous Waste Berm MP-HWB-1 did not contain pooled water.
11	***Calcium Chloride Storage Area*** - It is recommended that a perimeter berm/drainage ditch be installed to route the runoff away from the storage and down the slope hill to the drainage ditch along the Tote Road as a preventative measure. - BIMC has committed to visual monitoring and flow mapping of the area during Freshet 2016 and that drainage measures will be implemented as appropriate. - This facility was inspected and no concerns were noted.	Very little to no runoff or water flow was observed at this location during 2016. BIMC will continue to monitor the area for runoff and will implement drainage measures where appropriate.

Notes:

[1] Item No. as referenced in AANDC Water Licence Inspection Report July 6 - 8, 2016

Table A.3 - Baffinland Response to INAC Water Licence Report Dated November 9, 2016 (Inspection Dates Sept 28and 29)		
ITEM No.[1]	**Observation or Item of Concern**	**Baffinland Responses**
Water Management Structures		
1	***Waste Rock Pile Sedimentation Pond and Surface Water Management Ditches*** *- BIMC explained that proper diversion ditches for this facility were constructed as noted in a previous inspection.* *- During inspection, snow cover prevented proper inspection of this facility.* *- Follow-up will be conducted when snow melts.*	The Waste Rock Settling Pond was completed in May 2016. Modifications were made to the ditching and diversion structures throughout the summer to ensure effective direction of surface water drainage. Nuna East was contracted to recontour and modify the water management infrastructure (sedimentation pond, drainage ditching, diversion berms) associated with the waste rock stockpile and pond. These modifications were effective in directing most runoff originating from the waste rock stockpile to the sedimentation pond. Monitoring of effectiveness of the ditching will be ongoing.
2	***Crusher Pad Construction*** *- A recent expansion of this facility was completed.* *- It was noted previously that BIMC had installed mitigation measures to address sedimentation during construction.* *- At the time of this inspection, BIMC left the mitigation measures in place to address possible sedimentation during spring melt.*	Noted.
3	***Crusher Pad Sedimentation Pond*** *- Significant snow cover prevented proper inspection of this facility; however, no signs of leaks were apparent.*	Noted.
4	***Ore Stockpile Sedimentation Pond West*** *- During the July 2016 Geotechnical Inspection, it was identified that there is concern over the stability of the liner in this pond.* *- Furthermore, culvert inlet is possibly allowing water to flow under the liner. This must be repaired during the next construction season.*	Tires, serving as ballast, have been placed on the exposed areas of the liner in accordance with the instructions provided by Baffinland's geotechnical consultant. Concerns associated with the liner at the inlet of the West Ore Stockpile Sedimentation Pond will be addressed by May 31, 2017, assuming ground conditions are sufficiently thawed to allow for the keying in of the liner at that time. The work will proceed in accordance with instructions provided by Baffinland's geotechnical inspection engineer. In the interim prior to final repair, contingency measures will be in place to direct the water appropriately.
5	***Ore Stockpile Sedimentation Pond East*** *- At the time of the inspection, the water within the pond was approximately 30 cm from overtopping. It was recommended to BIMC that this pond be decanted to prevent uncontrolled discharge from this facility.*	The water contained in the East Ore Stockpile Sedimentation Pond is currently frozen. The water level in the sedimentation pond will be monitored closely and discharged to the receiving environment during the spring melt in 2017. A pre-discharge sample was taken just prior to freeze-up. The results of the sample met effluent requirements for this location. Discharge from the Ore Stockpile Sedimentation Ponds in Milne Port will meet the water quality criteria outlined in the Type A Licence (2AM-MRY1325).

6	**Hazardous Waste Berms (MS-HWB1 to 6, and MP-HWB-1, MP-HWB-3 to 5)** *- All hazardous waste berms were inspected.* *- All waste was contained within the facility and no signs of leaks were apparent.*	Noted.
7	***Polishing Waste Stabilization Ponds (Three Ponds at Mary River and One Pond at Milne Port)*** *- Significant snow cover prevented a proper inspection; however, no signs of leaks in the berm walls or tears in the liner were apparent.*	Noted.
8	***Ore Stockpile Pad Diversion Ditches*** *- No concerns related to this infrastructure.*	Noted.
9	***Contaminated Snow Containment Facility*** *- Significant snow cover prevented proper inspection of this facility; however, no signs of leaks were apparent.*	Noted.
10	***Landfarm Facility*** *- Significant snow cover prevented proper inspection of this facility; however, no signs of leaks were apparent.*	Noted.
11	***Bulk Fuel Storage Facility at Mine Site, Aerodrome, and Milne Port*** *- No concerns with these structures.*	Noted.
Water Use		
12	*Records for water use were in good order at the time of the inspection at both Milne Port and Mary River Mine Site.*	Noted.
13	*At the time of the inspection, water was primarily being used to support camp functions.*	Noted.
Waste Discharges		
14	*BIMC was discharging sewage waste as intended. No other discharges of wastes were occurring during the inspection.*	Noted.
15	*Records of sewage discharges were in good order.*	Noted.
Erosion and Sedimentation		
16	***General Site Comment*** *- Due to the significant sedimentation of waterways around the Project, a Letter of Non-Compliance was issued to BIMC to address this issue.* *- In response to the Letter of Non-Compliance, BIMC has made significant progress related to mitigating sedimentation events from project activities.* *- On September 30, 2016 a Dust Mitigation Action Plan and a Sedimentation Mitigation Action Plan was submitted by BIMC to address the concerns over Dust and Sedimentation on site.*	Noted. We will endeavor to provide periodic updates on the progress made in the implementation of the Action Plans over the course of the winter.

17	***Jetty at Camp Lake*** *- The construction of this structure was complete at the time of the inspection.* *- Proper sedimentation measures were installed during construction.*	Silt curtains were installed around the perimeter of the Camp Lake Water Jetty during mid-July. In mid-September, the jetty was repaired and armoured along its perimeter in order to prevent similar erosion events from occurring in the future. All work was completed prior to freeze-up.
Culverts/Bridges		
18	***Bridges along Tote Road*** *- In a previous inspection it was noted that road material was being pushed into water courses that are crossed by a bridge.* *- BIMC has developed a plan to minimize the amount of road material entering major water courses.* *- This will be monitored during future inspections.*	Noted.

Notes:

[1] Item No. as referenced in AANDC Water Licence Inspection Report September 28 - 29, 2016

APPENDIX D.7.5

2016 QIA INSPECTION REPORTS

AND BAFFINLAND REPONSES

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Qikiqtani Inuit Association

July 18, 2016

Mr. Todd Burlingame
Vice President
Sustainable Development
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Mr. Burlingame,

RE: BAFFINLAND IRON MINES CORPORATION'S, MARY RIVER PROJECT, JUNE 2015 INSPECTION – QIKIQTANI INUIT ASSOCIATION FINDINGS AND RECOMMENDATIONS

This letter is being issued from the Qikiqtani Inuit Association (QIA) to Baffinland Iron Mines Corporation (BIMC) which provides a summary of the findings and recommendations from the QIA's June 2016 Inspection, as per Schedule E, Item 12 of the Commercial Lease No.: Q13C301 (CPL).[1] The Inspection was undertaken from June 24 to June 28, 2016, by ARKTIS Solutions Inc. (ARKTIS) on behalf of the QIA.

In summary, the June 2016 Inspection included the following activities:

- A general site inspection to assess BIMC's compliance with select environmental terms and conditions of any permits, licences, leases or other agreements that are associated with the Project;
- An update on the Tote Road Reconciliation, including the current status of survey and sections upgraded since the September 2015 Environmental Inspection;
- A review of the issues surrounding the KM 97 Borrow Source survey and volume calculation;
- A review of the proposed Q16 Quarry area; and,
- An inspection of BIMC's water management practices and infrastructure, in particular, those items described in Environment and Climate Change Canada's (ECCC) June 7, 2016, letter and Indigenous and Northern Affairs Canada's (INAC) June 16, 2016, notice.

The findings, recommendations, and action items from the June 2016 Inspection are provided in Table 1.

[1] QIA and BIMC (2013) Commercial Lease No. Q13C301. September 6, 2013.

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Please do not hesitate to contact the undersigned should you require any further information.

Sincerely,

Stephen Williamson Bathory
Director, Department of Major Projects

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Table 1. Summary of findings, recommendations, and action items from the September 2015 Environmental Inspection.

No.	Description of Concern or Finding	Recommended Action	Timeline	Responsible Party
1	There is windblown waste and rubbish around site following winter.	BIMC to complete site wide housekeeping and tidying.	16/07/31	BIMC
2	Liner from the Milne Port fuel bladder facility still located in the landfarm. The liner has been mostly segregated from the contaminated soils.	As previously agreed, BIMC is to package the liner in a lined sea can for shipment offsite during the 2016 sealift. A lined sea can is located adjacent to the landfarm. BIMC stated that they were unable to load the liner into the sea can in the landfarm, as it has the potential to rupture the liner due to weight; BIMC will use a long-arm excavator to complete the task. If the excavator is not available or can not be used for this purpose, an alternative method to remove the liner shall be developed (which will not rupture the liner) and implemented to meet the 2016 sealift.	16/09/30	BIMC
3	Evidence of free product, 1 mm thick on pooled water, in Hazardous Waste Berm MP-HWB-1.	BIMC to treat free product and contaminated water. BIMC to ensure exteriors of containers are not contaminated when removing these items from the hazardous waste berm.	16/09/21	BIMC

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No.	Description of Concern or Finding	Recommended Action	Timeline	Responsible Party
4	Sedimentation in stream at km 74, culvert CV211. Water flowing downhill along old alignment is sediment-bearing. Material stockpiled near downstream side of culvert may also be contributing to sedimentation. Upstream of culvert, the stream has minimal sediment load.	BIMC implemented sediment and erosion control methods within hours of documenting the event. Mitigation includes silt fences and flocculent impregnated jute.	16/06/26 Complete, Ongoing	BIMC
5		BIMC to relocate materials stockpiled near downstream side of culvert.	16/07/08	BIMC
6		BIMC to install rip rap on slopes near CV211 to reduce the potential of future events at this location.	16/07/31	BIMC
7	The landfill fencing is damaged following winter, and minor amounts of windblown waste is located outside the landfill perimeter.	BIMC to repair landfill fencing. BIMC to return waste outside of landfill to landfill.	16/07/31	BIMC
8	Fuel drums outside of containment near the Mine Site refueling station.	BIMC to relocate drums to containment area or use temporary containment beneath drums.	16/07/01 Complete	BIMC
9	Oil tote outside of containment in the southwest corner of the utilities complex.	BIMC to relocate tote to containment area or use temporary containment beneath tote.	16/07/01 Complete	BIMC
10	Drainage from QMR2 access road was redirected into Camp Lake Tributary 1 by breaching the perimeter berm of the access road. The breach in	BIMC to repair breach in berm. BIMC to implement a drainage plan for the QMR2 access road. The drainage plan shall be added as an appendix to the	17/03/31	BIMC

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No.	Description of Concern or Finding	Recommended Action	Timeline	Responsible Party
	the berm was unauthorized by the environmental department. The breach contributed to sedimentation events in the Camp Lake Tributary 1 as evidenced by the deployment of sediment and erosion control and deposited sediments.	QMR2 Quarry Management Plan, and submitted with the 2016 Annual Report.		
11	Fuel drum located on top of the aerodrome fuel berm.	BIMC to relocate drum to containment area or use temporary containment beneath drum.	16/07/01 Complete	BIMC
12	Free product, 1 mm thick, floating on surface of water in the Mine Site fuel bladder farm.	BIMC to treat free product and contaminated water. BIMC to ensure exteriors of containers are not contaminated when removing these items from the hazardous waste berm.	16/09/21	BIMC
13	Free product, 1 mm thick, floating on surface of water in Hazardous Waste Berm HWB-MS-4.	BIMC to treat free product and contaminated water. BIMC to ensure exteriors of containers are not contaminated when removing these items from the hazardous waste berm.	16/09/21	BIMC
14	Water has been relocated to the Mine Site fuel bladder farm for treatment, however, evidence of free product in Hazardous Waste Berm HWB-MS-3 sediments.	BIMC to ensure exteriors of containers are not contaminated when removing these items from the hazardous waste berm.	16/09/21	BIMC

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No.	Description of Concern or Finding	Recommended Action	Timeline	Responsible Party
15	Minimal number of drip trays located under the equipment located outside of the Mine Site Maintenance facilities; however, the Inspector is uncertain how long the equipment has been located there.	BIMC to send out notice reminding employees and contractors the importance and proper use of spill trays.	16/07/01 Complete	BIMC
16	Two totes of oil and hydraulic fluid located outside of containment behind Mine Site Toromont Maintenance Shop.	BIMC to relocate totes to containment area or use temporary containment beneath totes.	16/07/01 Complete	BIMC
17	Totes of waste oil and other hazardous material located in front of Mine Site Maintenance Shop. This material is awaiting pickup for transfer to the hazardous waste berms.	BIMC to construct a small hazardous waste berm for temporary storage of the hazardous waste material while awaiting pick-up.	16/07/01 Complete	BIMC
18	Recently constructed drainage ditches for the waste rock stockpile pond were not properly constructed. Ditching is currently redirecting runoff around the waste rock stockpile sedimentation pond. Ditching was intended to capture runoff from the waste rock stockpile while diverting runoff not from the waste rock stockpile (**Error! Reference source not found.** to **Error! Reference source not found.**).	BIMC promptly reconstructed the ditching so that runoff from the waste rock stockpile is collected into the waste rock stockpile pond.	16/06/27 Complete	BIMC

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No.	Description of Concern or Finding	Recommended Action	Timeline	Responsible Party
19	Mine Site crusher and ore stockpile pad exceeded the design footprint and impinged on the 31 m buffer area between Project infrastructure and water bodies (Sheardown Lake Tributary) (**Error! Reference source not found.**).	BIMC to re-construct pad to the proposed design criteria ensuring that there is a 31 m buffer area between the Project infrastructure and all water bodies. Ditching will be located on the perimeter of the crusher pad as required by ECCC's Fisheries Act Direction. BIMC will be expanding the crusher pad beyond the current for-construction drawing footprint; the drawings for this expansion are currently being developed.	16/07/17	BIMC
20	The hazardous waste berms at the Project have been subject to continuing spills of waste oil over the past year. Due to the limited capacity of the oily water separator plant (OWSP), and the long period of frozen conditions, it may take the majority of the unfrozen months to clean up these spills.	It is recommended that BIMC review their hazardous waste management policy, to mitigate against spills moving forward.	None	BIMC
21	If untreated water cannot be managed effectively with the current OWSP, improvements to the OWSP (or management of the water) may be required.	It is recommended that BIMC review the current capacity of the OWSP, the current and future demand on the OWSP, and the time required annually for the OWSP to treat the contaminated water on site. BIMC shall provide a report these findings to the QIA.	16/09/21	BIMC

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No.	Description of Concern or Finding	Recommended Action	Timeline	Responsible Party
22	In the construction zone from km 77 to km 74, BIMC has used made frequent use of sedimentation and erosion controls. Deposited sediment upstream of these controls demonstrates BIMC's effective employment of the devices.	The sedimentation events in the km 74 to km 77 construction area may be a result of construction activities; however, due to the long, and occasionally steep slopes in this area, it is recommended that all slopes along this section near stream crossings be lined with geosynthetic liner and rip rap to prevent future occurrences. It is recommended that a timeline for completing this task be discussed as part of the Tote Road Management Plan.	16/09/30	BIMC
23	The characteristics of the Tote Road and the stream crossings along the Tote Road change frequently from the Mine Site to Milne Port.	To manage the Tote Road effectively, it is recommended that the Tote Road Management Plan be developed in consideration of these different intervals along the Tote Road. Additionally, it is recommended that the Tote Road Management Plan incorporate maps for each interval, showing high risk sections, what sediment and erosion control is in place, and fish-bearing waterbodies.	16/09/30	BIMC

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November 12, 2016

Mr. Stephen Williamson Bathory
Director Major Projects

Qikiqtani Inuit Association
Igluvut Building, 2nd floor
P.O. Box 1340
Iqaluit, NU
X0A 0H0

Re: Response to Findings and Recommendations - QIA June Inspection

Dear Stephen:

During June 24th to June 28th, 2016, Arktis Solutions Inc. conducted an environmental inspection at Baffinland's Mary River Project. During the inspection, several concerns and recommendations were identified and outlined in the QIA letter dated July 18, 2016.

The attached Table A.1 summarizes the findings and recommendations noted by QIA during the June inspection and provides Baffinland's response.

Please do not hesitate to contact us should you have any further comments or questions.

Sincerely,

James Millard
Environmental Manager

Attach: QIA Letter to Baffinland, dated July 18, 2016 (eight pages)
Table A.1 – Baffinland Response to QIA Letter (three pages)

Cc: Jamie Van Gulck (Arktis Solutions)
Todd Burlingame, Wayne McPhee (Baffinland)

Table A.1 - Baffinland Response to QIA Letter, dated July 18, 2016 (Inspection date June 24-28)

No.	Description of QIA Inspector's Concern or Finding	QIA Recommended Action	Item Status	BIM Response
1	There is windblown waste and rubbish around site following winter.	BIMC to complete site wide housekeeping and tidying.	Completed	Throughout the summer months, each department initiated the clean-up and organization of their respective work areas. Windblown waste and debris left over from the spring melt was collected, segregated and disposed of according to the Baffinland Waste Management Plan. Baffinland will continue to initiate and encourage site wide housekeeping and clean-up events in the future. In addition, the Environment department will continue conduct routine inspections and audits to ensure departments are adhering to the Waste Management Plan.
2	Liner from the Milne Port fuel bladder facility still located in the landfarm. The liner has been mostly segregated from the contaminated soils.	As previously agreed, BIMC is to package the liner in a lined sea can for shipment offsite during the 2016 sealift. A lined sea can is located adjacent to the landfarm. BIMC stated that they were unable to load the liner into the sea can in the landfarm, as it has the potential to rupture the liner due to weight; BIMC will use a long-arm excavator to complete the task. If the excavator is not available or can not be used for this purpose, an alternative method to remove the liner shall be developed (which will not rupture the liner) and implemented to meet the 2016 sealift.	Completed	Most of the accessible HDPE liner was removed from the Milne Port landfarm prior to September 30, 2016, and stored in lined seacans for shipment off site during the 2017 sealift. Following the 2017 spring melt, the landfarm will be operated in accordance with the approved Baffinland *Landfarm Operation, Maintenance and Monitoring Manual*.
3	Evidence of free product, 1 mm thick on pooled water, in Hazardous Waste Berm MP-HWB-1.	BIMC to treat free product and contaminated water. BIMC to ensure exteriors of containers are not contaminated when removing these items from the hazardous waste berm.	Completed	Contaminated water contained in Hazardous Waste Berm MP-HWB-1 was transported to the Milne Port Contaminated Snow Storage Facility for treatment. Impacted water contained within the Contaminated Snow Storage Facility was treated using the onsite oily water treatment plant and discharged to the receiving environment during late August 2016. The discharged effluent discharged met the water quality criteria outlined in the Type A Water Licence (2AM-MRY1325).
4	Sedimentation in stream at km 74, culvert CV211. Water flowing downhill along old alignment is sediment-bearing. Material stockpiled near downstream side of culvert may also be contributing to sedimentation. Upstream of culvert, the stream has minimal sediment load.	BIMC implemented sediment and erosion control methods within hours of documenting the event. Mitigation includes silt fences and flocculent impregnated jute.	Completed	Noted.
		BIMC to relocate materials stockpiled near downstream side of culvert.	Completed	The materials stockpiled downstream of CV211 were removed in late June.
		BIMC to install rip rap on slopes near CV211 to reduce the potential of future events at this location.	1-May-17	Rip rap (aggregate) has yet to be installed along the slopes and drainage routes near CV211. Rip rap will be installed along the slopes near CV211 by June 1, 2017.
7	The landfill fencing is damaged following winter, and minor amounts of windblown waste is located outside the landfill perimeter.	BIMC to repair landfill fencing. BIMC to return waste outside of landfill to landfill.	Completed	A small quantity of windblown landfill waste outside of the perimeter fence was collected and redeposited back to the landfill in June 2016. The existing fence was temporarily repaired. A new perimeter fence was installed around the open face of the landfill during September 2016. The fence is positioned around the northern perimeter of the landfill and has so far proven effective in capturing windblown waste originating from the landfill.
8	Fuel drums outside of containment near the Mine Site refueling station.	BIMC to relocate drums to containment area or use temporary containment beneath drums.	Completed	The fuel drums were placed within secondary containment (spill tray).
9	Oil tote outside of containment in the southwest corner of the utilities complex.	BIMC to relocate tote to containment area or use temporary containment beneath tote.	Completed	The oil tote has been placed within secondary containment (spill tray).
10	Drainage from QMR2 access road was redirected into Camp Lake Tributary 1 by breaching the perimeter berm of the access road. The breach in the berm was unauthorized by the environmental department. The breach contributed to sedimentation events in the Camp Lake Tributary 1 as evidenced by the deployment of sediment and erosion control and deposited sediments.	BIMC to repair breach in berm. BIMC to implement a drainage plan for the QMR2 access road. The drainage plan shall be added as an appendix to the QMR2 Quarry Management Plan, and submitted with the 2016 Annual Report.	1-May-17	Baffinland will repair the breach in the berm prior to freshet 2017 and reconfigure the drainage so as to not impact the nearby streams. Consideration will be given to adding a drainage plan for the QMR2 access road to the existing QMR2 Quarry Management Plan.
11	Fuel drum located on top of the aerodrome fuel berm.	BIMC to relocate drum to containment area or use temporary containment beneath drum.	Completed	The fuel drum has been placed inside the Aerodrome fuel berm.

Table A.1 - Baffinland Response to QIA Letter, dated July 18, 2016 (Inspection date June 24-28)

No.	Description of QIA Inspector's Concern or Finding	QIA Recommended Action	Item Status	BIM Response
12	Free product, 1 mm thick, floating on surface of water in the Mine Site fuel bladder farm.	BIMC to treat free product and contaminated water. BIMC to ensure exteriors of containers are not contaminated when removing these items from the hazardous waste berm.	Completed	Water contained within the former Mine Site fuel bladder farm (MS-HWB-7) berm was treated using the onsite oily water treatment plant and discharged to the receiving environment prior to freeze-up. The effluent discharged to the receiving environment met the water quality criteria outlined in the Type A Water Licence (2AM-MRY1325). In addition, Baffinland will inspect the exterior of containers for contamination prior to removing drums or totes from storage berms.
13	Free product, 1 mm thick, floating on surface of water in Hazardous Waste Berm HWB-MS-4.	BIMC to treat free product and contaminated water. BIMC to ensure exteriors of containers are not contaminated when removing these items from the hazardous waste berm.	Completed	Water contained within the Mine Site Hazardous Waste Berm MS-HWB-4 was treated using the onsite oily water treatment plant and discharged to the receiving environment prior to freeze-up. The effluent discharged to the receiving environment met the water quality criteria outlined in the Type A Water Licence (2AM-MRY1325). In addition, Baffinland will inspect the exterior of containers for contamination prior to removing drums or totes from storage berms.
14	Water has been relocated to the Mine Site fuel bladder farm for treatment, however, evidence of free product in Hazardous Waste Berm HWB-MS-3 sediments.	BIMC to ensure exteriors of containers are not contaminated when removing these items from the hazardous waste berm.	Completed	Baffinland will continue to inspect the exterior of containers for contamination prior to removing drums or totes from storage berms.
15	Minimal number of drip trays located under the equipment located outside of the Mine Site Maintenance facilities; however, the Inspector is uncertain how long the equipment has been located there.	BIMC to send out notice reminding employees and contractors the importance and proper use of spill trays.	Completed	Baffinland will continue to enforce the use of the spill trays under vehicles that are being parked for extended periods of time in accordance with Baffinland's Spill Tray Guideline. The Environment department will continue to send out reminders to employees stressing the importance of the use of the spill trays and compliance with this practice will be a component of routine environmental inspections conducted by the Environment Department.
16	Two totes of oil and hydraulic fluid located outside of containment behind Mine Site Toromont Maintenance Shop.	BIMC to relocate totes to containment area or use temporary containment beneath totes.	Completed	The two totes were relocated inside the Toromont Maintenance building and were placed into secondary containment (spill tray).
17	Totes of waste oil and other hazardous material located in front of Mine Site Maintenance Shop. This material is awaiting pickup for transfer to the hazardous waste berms.	BIMC to construct a small hazardous waste berm for temporary storage of the hazardous waste material while awaiting pick-up.	In Progress	The noted hazardous wastes outside of the Mobile Maintenance Shop have been transferred to the hazardous waste berms. Consideration is presently being given to fabricating a small berm for temporary hazardous waste storage outside of the Mobile Maintenance Shop.
18	Recently constructed drainage ditches for the waste rock stockpile pond were not properly constructed. Ditching is currently redirecting runoff around the waste rock stockpile sedimentation pond. Ditching was intended to capture runoff from the waste rock stockpile while diverting runoff not from the waste rock stockpile.	BIMC promptly reconstructed the ditching so that runoff from the waste rock stockpile is collected into the waste rock stockpile pond.	Completed	The Waste Rock Settling Pond was completed in May 2016. Modifications were made to the ditching and diversion structures throughout the summer to ensure effective direction of surface water drainage. Nuna East was contracted to recontour and modify the water management infrastructure (sedimentation pond, drainage ditching, diversion berms) associated with the waste rock stockpile and pond. These modifications were effective in directing most runoff originating from the waste rock stockpile to the sedimentation pond.
19	Mine Site crusher and ore stockpile pad exceeded the design footprint and impinged on the 31 m buffer area between Project infrastructure and water bodies (Sheardown Lake Tributary).	BIMC to re-construct pad to the proposed design criteria ensuring that there is a 31 m buffer area between the Project infrastructure and all water bodies. Ditching will be located on the perimeter of the crusher pad as required by ECCC's Fisheries Act Direction. BIMC will be expanding the crusher pad beyond the current for-construction drawing footprint; the drawings for this expansion are currently being developed.	Completed	During early July , the limits of the crusher pad were modified to allow for a 31 m buffer area between the crusher pad and nearby water bodies. Moreover, in accordance with the facility design intent, a perimeter ditch was completed around the crusher pad to redirect runoff to the crusher pad sedimentation pond. The construction drawings for the crusher pad expansion were submitted to QIA and others on September 29th as part of Fisheries Act Direction Completion Report.
20	The hazardous waste berms at the Project have been subject to continuing spills of waste oil over the past year. Due to the limited capacity of the oily water separator plant (OWSP), and the long period of frozen conditions, it may take the majority of the unfrozen months to clean up these spills.	It is recommended that BIMC review their hazardous waste management policy, to mitigate against spills moving forward.	Ongoing	Agreed, Baffinland agrees that a periodic reviews of hazardous waste and waste management are useful undertakings.

Table A.1 - Baffinland Response to QIA Letter, dated July 18, 2016 (Inspection date June 24-28)

No.	Description of QIA Inspector's Concern or Finding	QIA Recommended Action	Item Status	BIM Response
21	If untreated water cannot be managed effectively with the current OWSP, improvements to the OWSP (or management of the water) may be required.	It is recommended that BIMC review the current capacity of the OWSP, the current and future demand on the OWSP, and the time required annually for the OWSP to treat the contaminated water on site. BIMC shall provide a report of these findings to the QIA.	In Progress	To date, Baffinland has been able to effectively treat the volume of oily water using existing treatment facilities. The volume of oily water requiring treatment is safely stored in engineered lined facilities. Baffinland reviews storage and treatment capacity of its facilities on a periodic basis. Consideration is currently being giving to acquire additional equipment to increase the onsite capacity for hydrocarbon contaminated water treatment. In future, Baffinland will endeavor to update QIA and others on the status of this initiative.
22	In the construction zone from km 77 to km 74, BIMC has used and made frequent use of sedimentation and erosion controls. Deposited sediment upstream of these controls demonstrates BIMC's effective employment of the devices.	The sedimentation events in the km 74 to km 77 construction area may be a result of construction activities; however, due to the long, and occasionally steep slopes in this area, it is recommended that all slopes along this section near stream crossings be lined with geosynthetic liner and rip rap to prevent future occurrences. It is recommended that a timeline for completing this task be discussed as part of the Tote Road Management Plan.	In Progress	This area will be assessed for the requirement of further work such as the installation of geotextile and rip rap. The Tote Road Earthworks Execution Plan (TREEP) will be completed in February 2017 and will provide the scope and timeline for this work, if warranted. The TREEP will help to inform the contents of a revised Roads Management Plan.
23	The characteristics of the Tote Road and the stream crossings along the Tote Road change frequently from the Mine Site to Milne Port.	To manage the Tote Road effectively, it is recommended that the Tote Road Management Plan be developed in consideration of these different intervals along the Tote Road. Additionally, it is recommended that the Tote Road Management Plan incorporate maps for each interval, showing high risk sections, what sediment and erosion control is in place, and fish-bearing waterbodies.	In Progress	The existing Roads Management Plan (the Plan) will be revised to include a section focused on environmental protection measures and controls used along the Tote Road based on recognized environmental risks. The Snow Management Plan and initiatives outlined in the Tote Road Earthworks Execution Plan (TREEP), will also be included. The revised Roads Management Plan will be submitted to QIA and others by March 31, 2017. In the meantime, Baffinland may reach out to QIA and others to discuss some of the details of this plan prior to final submission.

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Qikiqtani Inuit Association

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August 25, 2016

Mr. Todd Burlingame
Vice President, Sustainable Development
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Mr. Burlingame,

RE: BAFFINLAND IRON MINES CORPORATION'S, MARY RIVER PROJECT, AUGUST 2016 INSPECTION – QIKIQTANI INUIT ASSOCIATION FINDINGS AND RECOMMENDATIONS

This letter is being issued from the Qikiqtani Inuit Association (QIA) to Baffinland Iron Mines Corporation (BIMC) which provides a summary of the findings and recommendations from the QIA's August 2016 Inspection, as per Schedule E, Item 12 of the Commercial Lease No.: Q13C301 (CPL).[1] The Inspection was undertaken from August 12 to 16, 2016, by ARKTIS Solutions Inc. (ARKTIS) on behalf of the QIA.

In summary, the August 2016 Inspection included the following activities:

- A general site inspection, with focus on the Tote Road, to assess BIMC's compliance with select environmental terms and conditions of any permits, licences, leases or other agreements that are associated with the Project;
- Assess the current status of construction and upgrades along the Tote Road; and,
- Interview with BIMC Environmental Manager to understand the monitoring and reporting activities associated with water crossings on the Tote Road during the construction and operation phases.

The findings, recommendations, and action items from the June 2016 Inspection are provided in Table 1.

[1] QIA and BIMC (2013) Commercial Lease No. Q13C301. September 6, 2013.

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Qikiqtani Inuit Association

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Resolute Bay

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Please do not hesitate to contact the undersigned should you require any further information.

Sincerely,

SWB

Stephen Williamson Bathory
Director, Department of Major Projects

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Table 1. Summary of findings, recommendations, and action items from the August 2016 Environmental Inspection.

Item No.	Concern Identified	Recommendation
1.	The water level in the East Sedimentation Pond, at Milne Ore Stock Pile Facility, is near the freeboard limit. Based on GPS readings, current freeboard is approximately 1 m. BIMC stated that the water quality in the pond was being sampled the day of inspection for comparison with effluent quality limits and that the freeboard requirement in the issued for construction drawings is 0.3 m. There is no freeboard requirement listed in the water licence.	**Recommendation 1:** If water in the pond meets the water quality criteria, it is recommended that the water be discharged before the freeboard limit is reached. If the water quality is not acceptable, it is recommended to relocate the water to an alternate approved containment facility, to ensure freeboard is not exceeded. During the Inspection, BIMC collected a water sample from this pond and agrees that if it is within licence limits for water quality criteria, discharge of water from the pond is to occur.
2.	The Milne landfarm contains waste debris including a HDPE liner (from the former bladder facility) mixed in with hydrocarbon contaminated soil. The waste debris and HDPE liner are a primary reason why the landfarm is currently not operational.	**Recommendation 2:** It is recommended that all debris, including the HDPE liner be removed and only design approved material be placed in the landfarm to allow for its operation, to treat hydrocarbon contaminated soil. This recommendation was also noted in previous 2015 and 2016 Environmental Inspections[2,3] during which BIMC agreed the activity would be completed by September 30, 2016.

[2] Qikiqtani Inuit Association November 2, 2015 letter to BIMC titled "Baffinland Iron Mines Corporation's, Mary River Project, June and July 2015 Inspections – Qikiqtani Inuit Association Findings and Recommendations".
[3] Qikiqtani Inuit Association July 18, 2016 letter to BIMC titled "Baffinland Iron Mines Corporation's, Mary River Project, June 2016 inspection – Qikiqtani Inuit Association Finding and Recommendations".

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Item No.	Concern Identified	Recommendation
		During the Inspection, BIMC agreed the landfarm cannot operate with the debris in the containment cell. The deadline of September 30, 2016 remains.
3.	Specified Substances have been stockpiled along KM 3 and 4 of the Tote Road. Additionally, screening of the quarried material has recently occurred at a location near KM 3.5. Stockpiling and processing of Specified Substances is an activity that is planned for the quarry site and managed under the Quarry Management Plan. This is not an approved activity along the Tote Road, which may have negative environmental impacts. For example, the quarry site monitors the surface run off water quality; however, this is not necessarily occurring at the Tote Road stockpiles.	**Recommendation 3:** If water is present, it is recommended that water quality downgradient of the stockpiled Specified Substances and screener location be monitored for potential impacts to the receiving environment. Parameters to monitor shall be the same as that applied to the quarry run off waters. Testing shall be at a frequency as applied to the quarry run off waters and defined in the water licence. If water quality monitoring results in unacceptable quality, corrective action shall be implemented immediately to reduce the water quality in the downstream. During the Inspection, BIMC agreed to complete water quality testing in this area.
4.	The perimeter fence for the Mary River landfill has been removed. A perimeter fence can be an effective method to manage windblown debris.	**Recommendation 4:** It is recommended that a perimeter fence to mitigate against windblown debris entering the receiving environment be reinstalled. This item was also identified during the June 2016 inspection[Error! Bookmark not defined.]. During the Inspection, BIMC agreed that a fence is effective in mitigating against windblown waste and this is noted in their management plans. Current planning is to have a fence installed in the 2016 season.

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Item No.	Concern Identified	Recommendation
5.	The recent fuel spill at Milne is in the process of being remediated. There will be a large volume of contaminated water that will require treatment prior to discharge (estimates are >70,000 m^3 of contaminated water). The contaminated water will be partially stored in new fuel bladders that will be positioned within the Milne fuel storage facility. The residual contamination in the fuel facility will likely result in additional contaminated water in the future and will require regular management. The current means available on site to treat hydrocarbon contaminated water has a treatment capacity of 50 to 70 m^3/day (dependent on influence concentration). Thus, there may be limited water treatment capacity to manage hydrocarbon contaminated water at site.	**Recommendation 5a:** BIMC complete a needs assessment to increase the capacity for hydrocarbon contaminated water treatment. This item was also identified during the June 2016 inspection**Error! Bookmark not defined.**. BIMC notes that the management of the contact water from the recent spill may need to be addressed independent from the current on-site treatment system. The details of the spill clean-up are not yet finalized at the current time. BIMC is of the opinion that the current treatment capacity available at site is sufficient to meet operational needs. **Recommendation 5b:** The use of fuel bladders at the Mary River project has been identified as environmental concern by QIA in the past. BIMC is reminded that the QIA do not accept the use of fuel bladders as an approved means for fuel storage. It is acknowledged that BIMC use of the fuel bladders in responding to this spill is only for the temporary storage of contact water. This practice is acceptable to QIA however must only be use for short-term temporary storage (not more than one-year).
6.	Based on a review of select management plans and responses from BIMC environmental staff, the QIA has formed the following opinions: i. The timing for the complete construction of the road is not well understood.	**Recommendation 6a:** In addition to the recommendation for the Tote Road Management Plan content provided to BIMC on August 1, 2016[5], the following items are recommended to be included within the Tote Road Management Plan:

[5] Qikiqtani Inuit Association August 1, 2016 letter to Baffinland Iron Mines Corporation titled "Tote Road Management Plan – Preliminary Report Content".

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Item No.	Concern Identified	Recommendation
	ii. Operations of the road are occurring prior to complete construction of the road. iii. There are road construction upgrades that are not in accordance with the issued for construction drawings, and modifications have been completed during construction to address safety and operational efficiency. iv. There is uncertainty on the expected as-built information to be reported by BIMC. The timing for reporting as-built information is also not well understood. v. The water quality criteria to apply to water crossings during construction, operation and closure phases are uncertain. vi. The locations for water quality monitoring appear to be mainly associated with water crossings that may have a potential impact on fish. Monitoring of water crossings, or other water bodies potentially impacted by the Tote Road, may not be captured within the current monitoring program. There are potential implications regarding the assessment of changes to water quality, as needed to evaluate impacts as per the Water Compensation Agreement[4]. vii. There is a need to have a response action framework to document the decision process on when to implement sediment and erosion control measures, and dust control measures, to mitigate against potential impacts to water.	i. The process BIMC is to follow to complete a modification of the Tote Road design during construction. A modification may be related, but not limited to: realignment, cut and fill, or change to a water crossing. ii. Outline the expected Tote Road, and associated infrastructure, as-built information that will be reported to QIA. iii. Outline the anticipated construction, operation and closure phase timelines. iv. Outline the water quality monitoring locations, frequency and parameters to test for each of the following phases: construction, operation and closure. Monitoring is to address, but not be limited to: water crossing locations; adjacent water bodies; abandoned road sections; effects from dust accumulation; and subsequent drainage to water. v. Water quality criteria during the construction, operations and closure phases of the project. vi. Document the response action framework to limit potential impact to water from sedimentation and erosion onto waters. vii. Document the response action framework to limit potential impacts to water from dust. viii. Pertinent management outcomes from the work being completed to address the ECCC directive. **Recommendation 6b:** Yearly as-built information for the Tote Road be submitted to QIA within the Annual Report.

[4] Qikiqtani Inuit Association and Baffinland Iron Mines Corporation (2013). Water Compensation Agreement. Signed May 3, 2013.

ᑎᑎᖅᑲᐅᑎᖓ 1340, ᐃᖃᓗᐃᑦ, ᓄᓇᕗᑦ X0A 0H0 • ᐅᖄᓚᐅᑖ (867) 979-5391 • ᐊᑭᖃᖏᑦᑐᖅ 1 800-667-2742 • ᓯᑲᓐᑐᖅ (867) 979-3238 • ᖃᕆᓴᐅᔭᒃᑯᑦ qikiqtani.nu.ca
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November 14, 2016

Mr. Stephen Williamson Bathory
Director Major Projects

Qikiqtani Inuit Association
Igluvut Building, 2nd floor
P.O. Box 1340
Iqaluit, NU
X0A 0H0

Re: Response to Findings and Recommendations - QIA August Inspection

Dear Stephen:

During August 12th to August 16th, 2016, Arktis Solutions Inc. conducted an environmental inspection at Baffinland's Mary River Project. During the inspection, several concerns and recommendations were identified and outlined in the QIA letter dated August 25, 2016.

The attached Table A.1 summarizes the findings and recommendations noted by QIA during the August inspection and provides Baffinland's response.

Please do not hesitate to contact us should you have any further comments or questions.

Sincerely,

James Millard
Environmental Manager

Attach: QIA Letter to Baffinland, dated August 25, 2016 (six pages)
Table A.1 – Baffinland Response to QIA Letter (two pages)
Cc: Jamie Van Gulck (Arktis Solutions)
Todd Burlingame, Wayne McPhee, Sylvain Proulx, Robert Gagne (Baffinland)

Table A.1 - Baffinland Response to QIA Letter, dated August 25, 2016 (Inspection Date August 12-16)

No.	Description QIA Inspector's Concern or Finding	QIA Recommended Action	Item Status	BIM Response
1	The water level in the East Sedimentation Pond, at Milne Ore Stock Pile Facility, is near the freeboard limit. Based on GPS readings, current freeboard is approximately 1 m. BIMC stated that the water quality in the pond was being sampled the day of inspection for comparison with effluent quality limits and that the freeboard requirement in the issued for construction drawings is 0.3 m. There is no freeboard requirement listed in the water licence.	Recommendation 1: If water in the pond meets the water quality criteria, it is recommended that the water be discharged before the freeboard limit is reached. If the water quality is not acceptable, it is recommended to relocate the water to an alternate approved containment facility, to ensure freeboard is not exceeded. During the Inspection, BIMC collected a water sample from this pond and agrees that if it is within licence limits for water quality criteria, discharge of water from the pond is to occur.	Ongoing	The recommendation provided by QIA is standard practice for operations of Baffinland's sedimentation ponds. The recommended minimum freeboard for the operation of the Milne Ore Stockpile Sedimentation Ponds is 0.3 m, based on the design engineer's recommendation. The water quality and freeboard in the ponds are and will be monitored closely. The ponds were discharged periodically throughout the summer period in accordance with the applicable terms, conditions, and effluent criteria outlined in Type A Water Licence (2AM-MRY1325).
2	The Milne landfarm contains waste debris including a HDPE liner (from the former bladder facility) mixed in with hydrocarbon contaminated soil. The waste debris and HDPE liner are a primary reason why the landfarm is currently not operational.	Recommendation 2: It is recommended that all debris, including the HDPE liner be removed and only design approved material be placed in the landfarm to allow for its operation, to treat hydrocarbon contaminated soil. This recommendation was also noted in previous 2015 and 2016 Environmental Inspections [2,3] during which BIMC agreed the activity would be completed by September 30, 2016. During the Inspection, BIMC agreed the landfarm cannot operate with the debris in the containment cell. The deadline of September 30, 2016 remains.	Ongoing	Most of the accessible HDPE liner was removed from the Milne Port landfarm prior to September 30, 2016, and stored in lined seacans for shipment off site during the 2017 sealift. Other types of waste debris were also removed and properly sorted and disposed. Some oversize aggregate remains to be removed and this will be completed prior to May 31, 2017. During summer 2017, the landfarm will be operated in accordance with the approved Baffinland Landfarm Operation, Maintenance and Monitoring Manual.
3	Specified Substances have been stockpiled along KM 3 and 4 of the Tote Road. Additionally, screening of the quarried material has recently occurred at a location near KM 3.5. Stockpiling and processing of Specified Substances is an activity that is planned for the quarry site and managed under the Quarry Management Plan. This is not an approved activity along the Tote Road, which may have negative environmental impacts. For example, the quarry site monitors the surface run off water quality; however, this is not necessarily occurring at the Tote Road stockpiles.	Recommendation 3: If water is present, it is recommended that water quality downgradient of the stockpiled Specified Substances and screener location be monitored for potential impacts to the receiving environment. Parameters to monitor shall be the same as that applied to the quarry run off waters. Testing shall be at a frequency as applied to the quarry run off waters and defined in the water licence. If water quality monitoring results in unacceptable quality, corrective action shall be implemented immediately to reduce the water quality in the downstream. During the Inspection, BIMC agreed to complete water quality testing in this area.	Ongoing	Runoff or water flow was not observed downgradient of the crushing/screening activity at km 3.5 during the weekly water sampling events which occurred on August 22, August 29 and September 5. Because of this, no water quality monitoring location has been established at this time. During the spring and summer of 2017, BIMC will continue to monitor for runoff and water flow downgradient of the crushing/screening activity at km 3.5.
4	The perimeter fence for the Mary River landfill has been removed. A perimeter fence can be an effective method to manage windblown debris.	Recommendation 4: It is recommended that a perimeter fence to mitigate against windblown debris entering the receiving environment be reinstalled. This item was also identified during the June 2016 inspection. During the Inspection, BIMC agreed that a fence is effective in mitigating against windblown waste and this is noted in their management plans. Current planning is to have a fence installed in the 2016 season.	Completed	The old fence was removed during landfill berm extension activities. A new perimeter fence was installed around the open face of the landfill during September 2016. The fence is positioned around the northern perimeter of the landfill and has proven effective in capturing windblown waste originating from the landfill. Wind blown waste captured by the fence is routinely removed and redeposited back in the landfill.

Table A.1 - Baffinland Response to QIA Letter, dated August 25, 2016 (Inspection Date August 12-16)

No.	Description QIA Inspector's Concern or Finding	QIA Recommended Action	Item Status	BIM Response
5	The recent fuel spill at Milne is in the process of being remediated. There will be a large volume of contaminated water that will require treatment prior to discharge (estimates are >70,000 m3 of contaminated water). The contaminated water will be partially stored in new fuel bladders that will be positioned within the Milne fuel storage facility. The residual contamination in the fuel facility will likely result in additional contaminated water in the future and will require regular management. The current means available on site to treat hydrocarbon contaminated water has a treatment capacity of 50 to 70 m3/day (dependent on influence concentration). Thus, there may be limited water treatment capacity to manage hydrocarbon contaminated water at site.	Recommendation 5a: BIMC complete a needs assessment to increase the capacity for hydrocarbon contaminated water treatment. This item was also identified during the June 2016 inspection BIMC notes that the management of the contact water from the recent spill may need to be addressed independent from the current on-site treatment system. The details of the spill clean-up are not yet finalized at the current time. BIMC is of the opinion that the current treatment capacity available at site is sufficient to meet operational needs. Recommendation 5b: The use of fuel bladders at the Mary River project has been identified as environmental concern by QIA in the past. BIMC is reminded that the QIA do not accept the use of fuel bladders as an approved means for fuel storage. It is acknowledged that BIMC use of the fuel bladders in responding to this spill is only for the temporary storage of contact water. This practice is acceptable to QIA however must only be use for short-term temporary storage (not more than one-year).	Ongoing	To date, Baffinland has been able to effectively treat the volume of oily water using the existing treatment plant. The volume of oily water requiring treatment is safely stored in engineered lined facilities. Baffinland reviews storage and treatment capacity of its facilities on a periodic basis. Consideration is currently being given to acquiring additional equipment to increase the onsite capacity for hydrocarbon contaminated water treatment, specifically to deal with the recent spill referenced in QIA's comments. In future, Baffinland will endeavor to update QIA and others on the status of this initiative. Baffinland is currently utilizing fuel bladders as short term storage for hydrocarbon residuals and contaminated water associated with the fuel spill and has no plans to use the bladders to store fuel for the longer term. The fuel bladders currently are situated within the secondary containment (berm) of the Milne Port Tank Farm Facility.
6	Based on a review of select management plans and responses from BIMC environmental staff, the QIA has formed the following opinions: i. The timing for the complete construction of the road is not well understood. ii. Operations of the road are occurring prior to complete construction of the road. iii. There are road construction upgrades that are not in accordance with the issued for construction drawings, and modifications have been completed during construction to address safety and operational efficiency. iv. There is uncertainty on the expected as-built information to be reported by BIMC. The timing for reporting as-built information is also not well understood. v. The water quality criteria to apply to water crossings during construction, operation and closure phases are uncertain. vi. The locations for water quality monitoring appear to be mainly associated with water crossings that may have a potential impact on fish. Monitoring of water crossings, or other water bodies potentially impacted by the Tote Road, may not be captured within the current monitoring program. There are potential implications regarding the assessment of changes to water quality, as needed to evaluate impacts as per the Water Compensation Agreement[4]. vii. There is a need to have a response action framework to document the decision process on when to implement sediment and erosion control measures, and dust control measures, to mitigate against potential impacts to water.	Recommendation 6a: In addition to the recommendation for the Tote Road Management Plan content provided to BIMC on August 1, 2016 5, the following items are recommended to be included within the Tote Road Management Plan: i. The process BIMC is to follow to complete a modification of the Tote Road design during construction. A modification may be related, but not limited to: realignment, cut and fill, or change to a water crossing. ii. Outline the expected Tote Road, and associated infrastructure, as-built information that will be reported to QIA. iii. Outline the anticipated construction, operation and closure phase timelines. iv. Outline the water quality monitoring locations, frequency and parameters to test for each of the following phases: construction, operation and closure. Monitoring is to address, but not be limited to: water crossing locations; adjacent water bodies; abandoned road sections; effects from dust accumulation; and subsequent drainage to water. v. Water quality criteria during the construction, operations and closure phases of the project. vi. Document the response action framework to limit potential impact to water from sedimentation and erosion onto waters. vii. Document the response action framework to limit potential impacts to water from dust. viii. Pertinent management outcomes from the work being completed to address the ECCC directive. Recommendation 6b: Yearly as-built information for the Tote Road be submitted to QIA within the Annual Report.	Ongoing	Baffinland is currently considering the various recommendations provided in the August 1 letter as well as the items provided in the August 25, 2016, inspection report. We look forward to more fully responding to QIA on those items that directly relate to the Commercial Lease, e.g., Recommendation 6a (i., ii., iii) and 6b. The Roads Management Plan will be revised and submitted to QIA and others by March 31, 2017. This revised document will address these recommendations. With regard to water quality concerns and monitoring along the Tote Road, Baffinland continues to work with EC, INAC, DFO, as well as QIA on water quality and crossing issues and concerns. The development and implementation of the Sedimentation and Dust Mitigation Action Plans are examples of Baffinland's efforts and work in this regard.

APPENDIX D.7.6
2016 WSCC INSPECTION REPORTS
AND BAFFINLAND RESPONSES

WSCC Workers' Safety & Compensation Commission | ᐃᖅᑲᓇᐃᔭᖅᑎᓄᑦ ᐊᑦᑕᓇᖅᑐᓂᒃ ᐊᒻᒪ ᓇᓪᓕᐅᒃᑯᒪᓂᒃ ᖃᐅᔨᓴᖅᑎᑦ

20160129

email Bernard.Laflamme@baffinland.com

Bernard Laflamme
Chief Operating Officer
Baffinland Iron Mines Corporation
2275 Upper Middle Road East - Suite 300
Oakville ON L6H 0C3

Dear Mr. Laflamme:

Further to the **Mine Health and Safety Act article 26** attached is my 20160129 Mary River project inspection report.

As per **MHSA article**

28. please post a copy of this inspection report in a conspicuous location, and

29. advise the chief inspector within 30 days of the remedial measures taken and the remedial measures still to be taken in respect of the inspection report.

32.(1) A person who is adversely affected by a decision or order issued by an inspector may appeal the decision or order, in writing, to the chief inspector within 30 days after its issue.

The WSCC is committed to service excellence. If you have any questions or concerns about this inspection report, please feel free to contact my supervisor Fred Bailey or myself. His phone number is 867 669 4430 or email fred.bailey@wscc.nt.ca.

Sincerely
Workers' Safety and Compensation Commission of the NWT and NU Mine Safety

Martin van Rooy
Engineer/Mines Inspector

cc OHSC c/o tony.noseworthy@baffinland.com

WSCC Workers' Safety & Compensation Commission | ᐃᓯᒃᑲᓇᐃᓴᖅᑎᓄᑦ ᐊᑦᑕᓇᖅᑐᓂᒃ ᐊᒻᒪ ᓇᓪᓕᒃᑯᒪᓂᒃ ᖃᐅᔨᓴᖅᑎᑦ

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Mine:	Mary River project	Location:	~950 km NW of Iqaluit	
Operator:	Baffinland Iron Mines Corp.	Lat. 71-19'N		Long. 79-24'W
Manager:	Bernard Laflamme	Inspection Date:		20160114 to 19
Address	2275 Upper Middle Road East - Suite 300 Oakville ON L6H 0C3			

Fred Bailey (chief inspector of mines) and Martin van Rooy (engineer/mine inspector) conducted a general safety inspection of Baffinland's Milne Inlet site, Tote Road and Mary River site. Baffinland's response to WSCC's safe advantage program was audited.

At Milne Inlet the ore storage pad, site services shop, welding shop, Toromont's shop, Maintenance shop, site services garage, incinerator building, ERT building, sewage treatment plant, water treatment plant, Fountain tire's shop and warehouse were checked.

At Mary River the ERT building, welding shop, maintenance shop, truck wash building, Toromont shop, crushing plants C and B, Winterhaven camp, incinerator building, site services garage, warehouse, vehicle fuel station, component rebuild shop, power plant electrical switch rooms 1 and 2 and E-house #1 at camp were checked.

Robert Bateman, Keith Butt, Thane Champion, Tess Daoust, Darryl Finlay, Roland Hardy, Jerry Hodnett, Matthew Johnson, Nuyalea Kipanik, Robert Lanyon, Quency Lewis, Noel O'Brian and Dale Wales accompanied Fred Bailey and Martin van Rooy for parts of this inspection.

Noticed the flagging along some sections of the Tote road and bends is missing, making it difficult to see the road's direction and or edge in the dark.

1 Please consult with the ore haul truck drivers, to identify those sections of Tote road where additional flagging is required, to assist in travel guidance of the road.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Date of Report 20160129 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed at Milne after the ore haul trucks have dumped their load, the truck is moved away from the dump to check for hang-ups in the trailers and to clean the door gap before closing the dump door. This action requires the operator to walk the full length of the rig in the dark exposing him/her to the mobile equipment working in the area.

2 Please establish an area complete with suitable flood lighting, away from the mobile equipment work area, where the haul trucks can stop and the operator can check for hang-ups and clean their trailers.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

MHSR sect 9.43. *Subject to section 9.44 and unless otherwise specified in these regulations, the manager shall ensure that at all working places on the surface of a mine, suitable and adequate illumination is provided that meets the standards set out in the ANSI/IES Standard RP-7-1979, American National Standard Practice for Industrial Lighting.*

Noticed there are no lights at the ore haul truck-parking area at Milne Inlet requiring the operators to walk to/from their equipment and around their equipment in the dark for their pre-operating inspection.

3 Please install suitable floodlights in the Milne Inlet ore haul truck's parking area so the operators can see and be seen.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

MHSR sect 9.43. *Subject to section 9.44 and unless otherwise specified in these regulations, the manager shall ensure that at all working places on the surface of a mine, suitable and adequate illumination is provided that meets the standards set out in the ANSI/IES Standard RP-7-1979, American National Standard Practice for Industrial Lighting.*

Date of Report 20160129 **Inspector** [signature]

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed Baffinland's procedure requires radio contact with the loader operator when entering his/her area. However, the loader's number is not clearly visible in the dark and therefore this is a problem when trying to contact an individual loader operator when more than one loader is working in the same area.

4 Please ensure a loader's identification is clearly visible during the day and nighttime operation.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed some supervisors are not ensuring that previously reported safety hazards, are not occurring in their work site i.e.
Milne Inlet:
a) site services shop - i) ready access to three fire extinguishers blocked by material stored in front of them, ii) truck HTP 012 battery box removed and the exposed battery terminals were not covered, iii) an electric cable hanging from cable tray in roof and its end not capped and tagged to advise where the other end is located, iv) welding cables lying indiscriminately across the floor without protection,
b) maintenance shop – puddle on floor because the sump is over flowing,
c) site service garage - the high-pressure Hotsy hose and wand is lying unprotected in trailer.
Mary River
a) incinerator building – puddle on floor because the sump is over flowing
b) warehouse – batteries stored without an insulating cover on their posts
c) component rebuild shop – i) oxygen and acetylene cylinders stored together and not separated by 60 feet, ii) oxygen and acetylene cylinders not properly secured to prevent their falling over, iii) two come-a-longs with no safety latches in their hooks. iv) grinding disc lying flat on a horizontal surface

5 Please ensure all supervisors at least once each shift check for safety hazards in their area of responsibility.

MHSR sect 5.07. *Every shift boss or supervisor shall, within his or her area of responsibility and authority,*

Date of Report 20160129 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

(a) carry out the duties set out in the Act and these regulations;
(b) give precedence to the health and safety of persons in his or her charge over any other duties and at the end of his or her shift, communicate with the next shift boss or supervisor all necessary information relating to health and safety concerns;
(c) ensure that all persons in his or her charge are adequately trained and given clear instructions regarding the work they are to perform;
(d) ensure compliance with the relevant provisions of the Act and these regulations;
(e) be knowledgeable about essential safeguards against hazards and about safe working procedures at the worksites for which he or she is responsible so that he or she can routinely assess the safety of the environment and operations affecting persons in those worksites;
(f) by thorough supervision, protect the health and safety of all persons in the area for which he or she is responsible;
(g) make himself or herself familiar with all parts of the area for which he or she is responsible including those parts where persons do not normally work and with safe escape routes, refuge stations and other mustering points;
(h) ensure that there is sufficient safety equipment of appropriate standards for the work being performed;
(i) expeditiously investigate and address health and safety matters drawn to his or her attention;
(j) record before the end of every shift in a log-book kept for that purpose, all matters affecting health and safety, making special notes of any unusual or hazardous conditions or deficiencies found during the shift and of any remedial actions taken; and
(k) read and countersign all reports of the previous shift and discuss any health and safety matters of concern and any unusual or hazardous conditions or deficiencies with persons under his or her control before deploying them to their worksites.

Noticed a grizzly-bar grate frame was being fabricated in the Milne Inlet site services shop. A service truck's crane was hooked to the frame and it appeared it was intended to use this crane to place the frame on a grizzly feeder hopper parked next to the crane in the shop. A number of deficiencies were noted, such as the cranes outrigger were not extended, the crane's horizontal boom reach and load capacity was approaching its limit, the frame's lifting lugs were welded perpendicular to its pulling force of the slings and a near horizontal sling angle is used to lift the frame. The supervisor was advised to review the lifting arrangement and not to install the frame with the service truck crane until it was

Date of Report 2016/01/29 **Inspector** [signature]

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

determined that the weight of the frame and its size could safely be installed onto the hopper with the service truck crane.

6 Please ensure no person performs any rigging or operates any hoisting or pulling equipment unless qualified and authorized.

MHSR sect 10.128.(3) *In addition to the requirements of sections 10.13 to 10.15, an operator of a crane, shovel, dragline, boom truck or similar type of equipment that uses a rope or cable to raise, lower or swing a load or materials during its work cycle shall be qualified in accordance with a program acceptable to the chief inspector.*

MHSR sect 10.13. *No person shall operate or service any equipment or system unless he or she has received the minimum training required for that particular equipment or system pursuant to the training program established by the manager under section 6.03 and is authorized to operate or service the equipment or system by his or her supervisor.*

Noticed in Milne Inlet's site services shop, a hot work permit issued for an area used for welding. The Baffinland hot work permit states a fire watch is required for three hours after the hot work is completed. The welder advised they do not stop the hot work three hours before the end of shift as they perform a hot change i.e. the welder works overtime until the next shift takes over. However if a person works overtime in addition to their twelve hour shift, they cannot have twelve hours rest between shifts.

7 Please ensure no person is scheduled to exceeds their twelve hour shift and ensure each person on site has a minimum of twelve hours rest between shifts.

MHSR sect 2.01.(1) *The manager shall not permit the employment of a person on surface of a mine for a period longer than 12 hours in a day and there shall be a minimum of 12 hours of rest between shifts.*

Noticed an oxygen/acetylene welding cart in Milne Inlet site service shop and at Mary River crusher plant `C` without a fire extinguisher, attached to the cart.

Date of Report 20160129 **Inspector** ________

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

8 Please check all oxygen/acetylene welding carts and ensure each is equipped with a suitable fire extinguisher

MHSR sect 10.135.(9) *The manager shall ensure that each welding machine and each set of oxygen and flammable gas cylinders in use is equipped with a fire extinguisher that*
(a) has a capacity for extinguishing a fire that is equal to or greater than a minimum Underwriters' Laboratories of Canada classification of 1A, 10B; and
(b) is suitable for class A and B fires.

Noticed a truck air receiver, in the Milne Inlet welding shop, was hooked-up to a 125-psi 60 cfm stationary air compressor. The welder advised they had installed the truck air receiver for added surge capacity from the compressor. He advised there was no engineering design performed for this installation. He was advised to remove the truck air receiver from stationary compressor discharge line, as the air receiver is not CSA approved system only SAE approved and therefore it may not be safe in this application. He complied, and disconnected the truck air receiver.

9 Please ensure no person modifies a high-pressure fluid system unless the modification has been designed or reviewed by an engineer.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

MHSR sect 10.97.(1) *Boilers, compressors and pressure vessels and associated piping and fittings shall be installed and maintained in accordance with CSA Standard B51-95, Boiler, Pressure Vessel and Pressure Piping Code, and the heated or refrigerated fluid plant shall comply with the requirements of the Boiler and Pressure Vessels Act and the regulations under that Act.*

Date of Report 2016 01 29 **Inspector** [signature]

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed in the Milne Inlet welding shop, a blowgun is used for compressed air cleaning. There is no sign at the blowgun, for restricting its use and or warning of the hazard of using compressed air for cleaning.

10 Please review the practice of using compressed air for cleaning and where this procedure is required, ensure-

a) a safe work procedure is developed that addresses without limiting, personal protective equipment, hearing protection, maximum air pressure to the blowgun, barricades around the work area...

b) people, authorized to use compressed air for cleaning, are trained in this safe work procedure, and

c) submit a copy of the safe work procedure for using compressed air for cleaning.

MHSR sect 10.121.(1) *The manager shall identify and supply all suitable personal protective equipment to be worn by the operator for the safe operation of all miscellaneous tools including grinders, chain saws, pneumatic tools and all power activated tools.*

(2) *No person shall use any miscellaneous tool unless*

(a) the person is trained and authorized to use the tool;

(b) the person is wearing, and has received training on, the proper personal protective equipment required for the safe operation of the equipment; and

(c) the personal protective equipment is in good condition.

Noticed the pedestal grinder in Toromont shop at Milne Inlet is not equipped with a vacuum exhaust system, to extract the grinding dust, while grinding.

11 As noted in 12 October 2015 inspection report, please ensure a grinder is equipped with a suitable vacuum system to capture and remove the dust generated by the grinding process.

MHSR sect 10.122.(7) *Powered grinding wheels, other than portable hand held machines, shall be equipped with an exhaust system or other means for removing dust produced during the grinding operation.*

Date of Report 2016 01 29 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the Milne Inlet temporary warehouse building has now become the permanent warehouse building.

12 Please conduct an engineering assessment of this warehouse and submit the certified engineered drawings of this structure certifying it complies with national building code, national fire code and national electrical code.

MHSA art 2.(1) *The owner of a mine shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at the mine.*

(2) *The owner of a mine shall*
(a) implement and maintain work practices that are safe and that do not present undue risk to health; and
(b) provide and maintain healthy and safe worksites.

Noticed the red line field revisions drawn on the electrical schematics posted on the wall of the Milne Inlet E-house #1 and there were no electrical schematic posted on the wall of E-house #2.These as-built electrical revisions need to be up-dated on the original drawings and certified.

13 As previously noted in the 20 December 2014 inspection report, please ensure
a) the single line electrical schematics are revised at suitable intervals not exceeding 3 months, and
b) a clear legible copy of the most recent up-to-date single line schematic is posted on the wall in each electrical switch room and distribution room.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed the soot on the faces of the welders working in the Mary River welding shop and soot is accumulating on the surfaces inside the building. The welders confirmed that soot comes out of their nose, when they blow it into a clean tissue. The welders advised they have ~~a full-face~~ mask pressurized

Date of Report 2016 01 29 **Inspector** ____

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

respirator however, they only wear it for certain work but not all the time, while in the welding shop.

14 Please ensure people working in the welding shop at Milne Inlet and Mary River, wear their full-face mask pressurized respirator at all times while working in the welding shop, to avoid breathing in the contaminated shop air.

MHSR sect 10.135.(10) *The manager shall ensure that persons are protected from fumes, gases, dust, vapours and noise produced during a welding, cutting, brazing or heating operation and that*
(a) where general ventilation at the work is not sufficient a local exhaust system is used to minimize the exposure by persons to airborne contaminants produced by the operation; and
(b) procedures are established to reduce noise levels for persons using welding, burning, cutting, brazing or heating equipment and for persons working in the vicinity.

Noticed the landing at the south end of the mobile maintenance shop in Mary River, is about 12 inches above the shop floor and it is a potential trip hazard.

15 Please install a wide step for access to/from the shop floor to the landing

MHSR sect 1.89. *The manager shall provide a safe means of access to a work site*

Noticed further to the 12 October 2015 inspection report, the lid on the Milne Inlet 40-gallon solvent cleaning tank, was repaired however, the Mary River 40-gallon solvent cleaning tank lid is not repaired.

16 Please install the solvent tank lid's restraining device as per the manufacturer's instructions, to ensure the lid will automatically fall closed, in case of a fire in the solvent tank.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Date of Report 2016 01 29 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the truck wash shop, to wash the ore haul trucks and other mobile equipment, is under construction.

17 Please submit the certified electrical schematics for this shop and confirm the electrical equipment is compliant with CSA M421 Use of Electricity in Mines.

MHSR sect 13.01.(1) *The electrical system and electrical equipment at a mine shall be*
(a) designed in accordance with good engineering practice; and
(b) constructed in accordance with a design and plans that have been certified by a professional engineer.

(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed there were two men working from a Genie manlift and another two men working from a Skyjack scissor lift, inside Toromont's shop. The men on the Genie lift had recorded on their pre-operation sheet, their weight and the weight of tools and material loaded in the basket. However, the men using the Skyjack platform had not recorded their weights on the platform. The work was stopped, as these four men had not been checked-out by Baffinland's training department, for this equipment.

18 Please ensure no person operates any manlift device unless signed-off on Baffinland`s operating procedures, for these devices

MHSR sect 10.133.(1) *The manager shall ensure that a procedure is established for the safe operation, maintenance, inspection and testing of all portable or mobile platforms, scaffolding, bosun's chairs and other types of temporary work or access platforms.*

Noticed there are a number of accessible sections of conveyors in crushing plant 'A', 'B' and 'C' that do

Date of Report 20160129 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

not have nip point guards at their head, tail and tension pulleys.

19 Please install barricades at the crushing and screening plant equipment to prevent access to the moving parts while the equipment is running, or install nip point guards at the head, tail and tension pulleys.

MHSR sect 10.118.(3) *All accessible head, tail, drive and tension pulleys of a conveyor shall be effectively guarded at their nip points and the guards shall extend for a distance of at least 1 m from the nip point.*

Noticed the electrical panel #1 in the Winterhaven camp corridor, has open slots allowing access to the bus duct.

20 Please cover the open slots.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines*

Noticed the broken panic bar on the welding shop exit door and that some of the exit doors, in the Winterhaven camp, could not be opened because of ice build-up.

21 Please check and ensure all exit doors are maintained operational for use in case of an emergency.

MHSR sect 1.159.(1) *The manager shall prepare a procedure for the examination of worksites that provides for examination*
(i) of the emergency arrangements including safe means of egress;

Noticed the steps, to Mary River's incinerator service platform, are damaged.

Date of Report 20160129 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

22 Please repair the damaged steps

MHSR sect 1.89. *The manager shall provide a safe means of access to a work site*

Noticed the electrical panel, in the center of Mary River's site service building north wall, has no steps for ease of access.

23 Please provide a convenient access to the electrical panel.

MHSR sect 1.89. *The manager shall provide a safe means of access to a work site*

Noticed an 18,000 lt jet fuel tanker is parked with some other mobile equipment in Mary River's site service building.

24 Please review the procedure that must be followed for parking this fuel tanker inside this building and determine if the fire detection and protection is adequate when it is parked in this building.

MHSR sect 12.01.(1) *The manager shall ensure that a fire risk assessment is carried out not later than March 31 in each calendar year for all parts of the mine, both underground and surface, and the assessment shall*

(a) identify the potential for a fire or explosion by examining

(i) ignition sources, such as internal combustion engines, malfunctioning equipment, welding and burning and electrical equipment,

(ii) fuel sources such as combustible materials including class A ordinary combustibles and class B flammable and combustible liquids, and

(iii) the proximity of ignition sources to fuel sources, damaged equipment and accumulations of combustible materials;

(b) determine if persons may be exposed to the effect of fire;

(c) identify the need for fire protection and the type of fire protection that should be provided; and

(d) set out measures to be taken to reduce the hazard from fire, including

(i) equipment design,

Date of Report 2016 01 29 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

(ii) adequate maintenance of equipment,
(iii) proper training,
(iv) evacuation procedures,
(v) use of detection and early fire warning devices,
(vi) type of fire suppression equipment, and
(vii) means of egress from a worksite.

(2) *The manager shall ensure that*
(a) a complete audit is made of the fire risk assessment at least annually by a qualified person; and
(b) the results of the fire risk assessment are entered in the log-book kept for that purpose and are made available to an inspector and to the Committee.

MHSR sect 12.11. *The manager shall ensure that suitable warning signs identify all fire hazard areas, including*
(a) fuel storage areas;
(b) explosives storage areas;
(c) timber storage areas; and
(d) fuelling areas.

Noticed the long extension cords used for power to the toilets and frost fighters installed in Mary River's warehouse building.

25 Please install an electrical outlet at the equipment, plug the equipment directly into the outlet and remove the extension cord.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed the METSO HP epoxy backing material drums stored in the component rebuild shop however, the MSDS sheet for this product was not found in the MSDS book.

Date of Report 2016 01 29 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

26 Please ensure the latest version of this products MSDS sheet is available and that the people using this material have read and comply with its safety requirements.

MHSR sect 5.07. *Every shift boss or supervisor shall, within his or her area of responsibility and authority,*
(c) ensure that all persons in his or her charge are adequately trained and given clear instructions regarding the work they are to perform;

As a follow-up on the 28 May 2014 inspection report, the ore haul truck drivers were consulted for the areas along the Tote road where they do not have direct radio communication with the medic. They advised there are still problems at about the 30 and 60 km area of the Tote road.

27 Please consult with the ore haul truck drivers to determine where along the Tote road they are unable to make direct radio contact with the medic and ensure these blind spots are corrected.

MHSR sect 8.44. *There shall be an effective means of communication between the person in charge of the first aid facility and all worksites to be served.*

Noticed a number of changes have occurred in Baffinland's organization

28 Please submit an up-to-date copy of Baffinland's organization chart

MHSR sect 5.05.(1) *The manager shall prepare an organizational chart showing the job titles for the positions within the organization and the reporting relationships between the positions.*

(2) *The manager shall ensure that the areas of responsibility and authority are not so extensive as to prevent a shift boss or supervisor from diligently carrying out his or her duties concerning health and safety.*

Date of Report 2016/01/29 **Inspector** [signature]

Box 8888 • Yellowknife, NT X1A 2R3 • Telephone: (867) 920-3888 • Toll Free: 1-800-661-0792 • Fax: (867) 873-4596 • Toll Free Fax: 1-866-277-3677
Box 669 • Iqaluit, NU X0A 0H0 • Telephone: (867) 979-8500 • Toll Free: 1-877-404-4407 • Fax: (867) 979-8501 • Toll Free Fax: 1-866-979-8501
Box 368 • Rankin Inlet, NU X0C 0G0 • Telephone: (867) 645-5600 • Toll Free: 1-877-404-8878 • Fax: (867) 645-5601
Box 1188 • Inuvik, NT X0E 0T0 • Telephone: (867) 678-2301 • Fax: (867) 678-2302
www.wscc.nt.ca • www.wscc.nu.ca

February 9, 2016

Mr. Martin Van Rooy
Mines Inspector
Worker's Compensation Commission
PO Box 669
Iqaluit, Nunavut
X0A 0H0

Dear Martin,

Please find below, the Baffinland response to the site inspection dated January 29, 2016.

1. Noticed the flagging along some sections of the Tote road and bends is missing, making it difficult to see the road's direction and or edge in the dark.

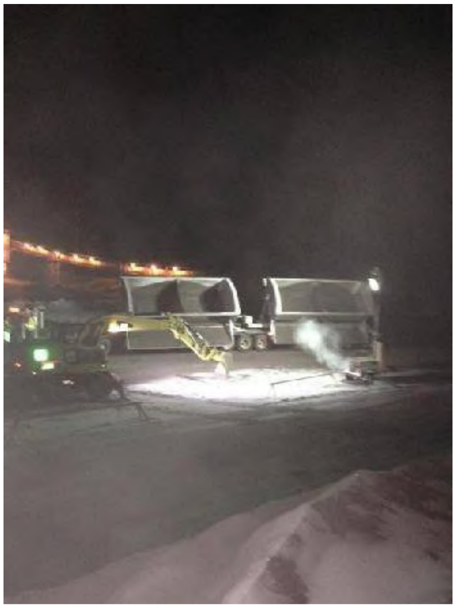
Please consult with the ore haul truck drivers, to identify those sections of Tote road where additional flagging is required, to assist in travel guidance of the road.

RESPONSE: *Completed April 8, 2016.*

2. Noticed at Milne after the ore haul trucks have dumped their load, the truck is moved away from the dump to check for hang-ups in the trailers and to clean the door gap before closing the dump door. This action requires the operator to walk the full length of the rig in the dark exposing him/her to the mobile equipment working in the area.

Please establish an area complete with suitable flood lighting, away from the mobile equipment work area, where the haul trucks can stop and the operator can check for hang-ups and clean their trailers.

Response: *Developed layout for the truck cleaning and positioned light plants accordingly. See photos below.*




3. Noticed there are no lights at the ore haul truck-parking area at Milne Inlet requiring the operators to walk to/from their equipment and around their equipment in the dark for their pre-operating inspection.

Please install suitable floodlights in the Milne Inlet ore haul truck's parking area so the operators can see and be seen.

Response: *Lighting at the laydown area for OHT parking:*

4. Noticed Baffinland's procedure requires radio contact with the loader operator when entering his/her area. However, the loader's number is not clearly visible in the dark and therefore this is a problem when trying to contact an individual loader operator when more than one loader is working in the same area.

Please ensure a loader's identification is clearly visible during the day and nighttime operation.

Response: *Determine and procure sample identification system. Install approved identification system. Target date to complete: May 31, 2016.*

---

5. Noticed some supervisors are not ensuring that previously reported safety hazards, are not occurring in their work site i.e.

Milne Inlet:

a) site services shop - i) ready access to three fire extinguishers blocked by material stored in front of them, ii) truck HTP 012 battery box removed and the exposed battery terminals were not covered, iii) an electric cable hanging from cable tray in roof and its end not capped and tagged to advise where the other end is located, iv) welding cables lying indiscriminately across the floor without protection,
b) maintenance shop – puddle on floor because the sump is over flowing,
c) site service garage - the high-pressure Hotsy hose and wand is lying unprotected in trailer.

Mary River:

a) incinerator building – puddle on floor because the sump is over flowing
b) warehouse – batteries stored without an insulating cover on their posts
c) component rebuild shop – i) oxygen and acetylene cylinders stored together and not separated by 60 feet, ii) oxygen and acetylene cylinders not properly secured to prevent their falling over, iii) two come-a-longs with no safety latches in their hooks. iv) grinding disc lying flat on a horizontal surface

Please ensure all supervisors at least once each shift check for safety hazards in their area of responsibility.

<u>RESPONSE:</u>

Milne Inlet:

5. a) Complete - Sent notice to supervisors of FPM to confirm (and demonstrate) that the immediate hazards listed by the Mines Inspector are addressed. Also sent instruction to all supervisors that upon issuing a daily report (as is often the case) that the expectations henceforth will be to include a section on safety observations of the day, corrective actions taken and etc. This will produce a record capable of demonstrating compliance to the Mines Inspector's report.

5. b) To be pumped regularly – Ongoing. Also, requested warehouse to stock sump pumps.

5. c) Complete February 08, 2016

Mary River:
5. a) To be pumped regularly – Ongoing.
5. b) Complete - The batteries have been covered. (Photo below). Please see attached memo regarding this matter.
5. c) Complete - Grinding disk, come-alongs without hook latch. Both taken out of service and disposed of. Bottles have been taken back to warehouse for proper storage and secured.

---

6. Noticed a grizzly-bar grate frame was being fabricated in the Milne Inlet site services shop. A service truck's crane was hooked to the frame and it appeared it was intended to use this crane to place the frame on a grizzly feeder hopper parked next to the crane in the shop. A number of deficiencies were noted, such as the cranes outrigger were not extended, the crane's horizontal boom reach and load capacity was approaching its limit, the frame's lifting lugs were welded perpendicular to its pulling force of the slings and a near horizontal sling angle is used to lift the frame. The supervisor was advised to review the lifting arrangement and not to install the frame with the service truck crane until it was determined that the weight of the frame and its size could safely be installed onto the hopper with the service truck crane.

Please ensure no person performs any rigging or operates any hoisting or pulling equipment unless qualified and authorized.

Response: *Members of FPM have been trained. This will be ongoing training for those who require it.*

---

7. Noticed in Milne Inlet's site services shop, a hot work permit issued for an area used for welding. The Baffinland hot work permit states a fire watch is required for three hours after the hot work is completed. The welder advised they do not stop the hot work three hours before the end of shift as they perform a hot change i.e. the welder works overtime until the next shift takes over. However if a person works overtime in addition to their twelve hour shift, they cannot have twelve hours rest between shifts.

Please ensure no person is scheduled to exceeds their twelve hour shift and ensure each person on site has a minimum of twelve hours rest between shifts.

Response: We have instructed our supervisors, superintendents and managers not to schedule overtime such that our staff don't have to work past the allowable 12 hours in any given day. If this cannot be achieved, we will ask for a variance for this.

---

8. Noticed an oxygen/acetylene welding cart in Milne Inlet site service shop and at Mary River crusher plant `C` without a fire extinguisher, attached to the cart.

Please check all oxygen/acetylene welding carts and ensure each is equipped with a suitable fire extinguisher

Response:
Completion Date: February 8, 2016.

9. Noticed a truck air receiver, in the Milne Inlet welding shop, was hooked-up to a 125-psi 60 cfm stationary air compressor. The welder advised they had installed the truck air receiver for added surge capacity from the compressor. He advised there was no engineering design performed for this installation. He was advised to remove the truck air receiver from stationary compressor discharge line, as the air receiver is not CSA approved system only SAE approved and therefore it may not be safe in this application. He complied, and disconnected the truck air receiver.

Please ensure no person modifies a high-pressure fluid system unless the modification has been designed or reviewed by an engineer.

Response: *Complete - The modification has been removed. Receiver was disconnected at the Milne welding shop.*

---

10. Noticed in the Milne Inlet welding shop, a blowgun is used for compressed air cleaning. There is no sign at the blowgun, for restricting its use and or warning of the hazard of using compressed air for cleaning.

Please review the practice of using compressed air for cleaning and where this procedure is required, ensure-

a) a safe work procedure is developed that addresses without limiting, personal protective equipment, hearing protection, maximum air pressure to the blowgun, barricades around the work area...
b) people, authorized to use compressed air for cleaning, are trained in this safe work procedure, and
c) submit a copy of the safe work procedure for using compressed air for cleaning.

Response: *Manager to prepare an SOP on cleaning with compressed air units. Target Completion Date: May 31, 2016. The blowgun has been taken out of service until SOP is developed.*

---

11. Noticed the pedestal grinder in Toromont shop at Milne Inlet is not equipped with a vacuum exhaust system, to extract the grinding dust, while grinding.

As noted in 12 October 2015 inspection report, please ensure a grinder is equipped with a suitable vacuum system to capture and remove the dust generated by the grinding process.

Response: Pedestal Grinder has been shut down and removed from use*. Completion Date: February 07, 2016.*

---

12. Noticed the Milne Inlet temporary warehouse building has now become the permanent warehouse building.

Please conduct an engineering assessment of this warehouse and submit the certified engineered drawings of this structure certifying it complies with national building code, national fire code and national electrical code.

Response: *The warehouse at the Port Site will have a engineer assessment for the above items. Completion date: June 30 2016*

---

13. Noticed the red line field revisions drawn on the electrical schematics posted on the wall of the Milne Inlet E-house #1 and there were no electrical schematic posted on the wall of E-house #2.These as-built electrical revisions need to be up-dated on the original drawings and certified.

As previously noted in the 20 December 2014 inspection report, please ensure

a) the single line electrical schematics are revised at suitable intervals not exceeding 3 months, and

b) a clear legible copy of the most recent up-to-date single line schematic is posted on the wall in each electrical switch room and distribution room.

Response: ***New drawings have been created and are under review. They will be posted after review is completed and appropriate corrections made. Drawing mounting boards are to be ordered. Expected completion May 31, 2016***

---

14. Noticed the soot on the faces of the welders working in the Mary River welding shop and soot is accumulating on the surfaces inside the building. The welders confirmed that soot comes out of their nose, when they blow it into a clean tissue. The welders advised they have a full-face mask pressurized respirator however, they only wear it for certain work but not all the time, while in the welding shop.

Please ensure people working in the welding shop at Milne Inlet and Mary River, wear their full-face mask pressurized respirator at all times while working in the welding shop, to avoid breathing in the contaminated shop air.

Response: *Welding helmets are on order at the Port site and are available at the Mine Site. Welders have been instructed to use them. Welding helmets scheduled to arrive at Port Site for May 10, 2016.*

---

15. Noticed the landing at the south end of the mobile maintenance shop in Mary River, is about 12 inches above the shop floor and it is a potential trip hazard.

Please install a wide step for access to/from the shop floor to the landing

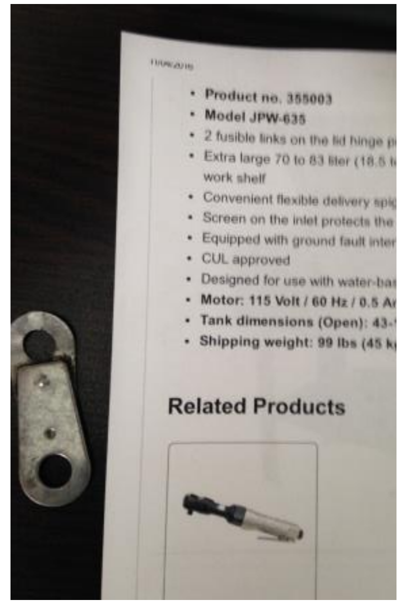
Response: *Completed: February 8, 2016*

---

16. Noticed further to the 12 October 2015 inspection report, the lid on the Milne Inlet 40-gallon solvent cleaning tank, was repaired however, the Mary River 40-gallon solvent cleaning tank lid is not repaired.

Please install the solvent tank lid's restraining device as per the manufacturer's instructions, to ensure the lid will automatically fall closed, in case of a fire in the solvent tank.

Response: *Latch Installed on April 11, 2016*



17. Noticed the truck wash shop, to wash the ore haul trucks and other mobile equipment, is under construction.

Please submit the certified electrical schematics for this shop and confirm the electrical equipment is compliant with CSA M421 Use of Electricity in Mines.

Response: *Completed on February 18, 2016: See file entitled "Item 17 Verification". These files have already been sent*

H349001-4750-70-082-0003-001.pdf H349000-4523-70-095-0001.pdf H349000-4523-70-090-0001.pdf E349000-PM114-70-090-0002.pdf E349000-PM114-70-090-0001.pdf E349000-PM114-50-042-0003.pdf

PH CONTROLLER ATM.PDF HYDROSITE ATM.PDF HYDROKLEEN ATM.PDF HYDROBLASTER ATM.PDF H349001-4750-70-082-0003-002.pdf

18. Noticed there were two men working from a Genie man lift and another two men working from a Skyjack scissor lift, inside Toromont's shop. The men on the Genie lift had recorded on their pre-operation sheet, their weight and the weight of tools and material loaded in the basket. However, the men using the Skyjack platform had not recorded their weights on the platform. The work was stopped, as these four men had not been checked-out by Baffinland's training department, for this equipment.

Please ensure no person operates any man lift device unless signed-off on Baffinland`s operating procedures, for these devices

Response: *Will ensure sign off to BIM procedures before equipment is released to contractors.*

---

19. Noticed there are a number of accessible sections of conveyors in crushing plant 'A', 'B' and 'C' that do not have nip point guards at their head, tail and tension pulleys.

Please install barricades at the crushing and screening plant equipment to prevent access to the moving parts while the equipment is running, or install nip point guards at the head, tail and tension pulleys.

Response: Photo below of barrier with warning.

---

20. Noticed the electrical panel #1 in the Winterhaven camp corridor, has open slots allowing access to the bus duct.

Please cover the open slots.

Response: *Blanks are installed. Completion April 08, 2016*

---

21. Noticed the broken panic bar on the welding shop exit door and that some of the exit doors, in the Winterhaven camp, could not be opened because of ice build-up.

Please check and ensure all exit doors are maintained operational for use in case of an emergency.

Response: *Emergency exit doors have been repaired.*


South End of Arctic Corridor (MSWH)

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22. Noticed the steps, to Mary River's incinerator service platform, are damaged.

Please repair the damaged steps

Response: *The platform has been repaired.*


Stairs repaired at the Incinerator Building (Mine Site)

---

23. Noticed the electrical panel, in the center of Mary River's site service building north wall, has no steps for ease of access.

Please provide a convenient access to the electrical panel.

Response: *Completed Date: April 12, 2016.*

24. Noticed an 18,000 lt jet fuel tanker is parked with some other mobile equipment in Mary River's site service building.

Please review the procedure that must be followed for parking this fuel tanker inside this building and determine if the fire detection and protection is adequate when it is parked in this building.

Response: *Hot work activities will not be permitted in that building. Signage will be posted. Target Completion Date: March 1, 2016. Completed February 13 2016*

25. Noticed the long extension cords used for power to the toilets and frost fighters installed in Mary River's warehouse building.

Please install an electrical outlet at the equipment, plug the equipment directly into the outlet and remove the extension cord.

Response: *COMPLETED on February 18, 2016*

---

26. Noticed the METSO HP epoxy backing material drums stored in the component rebuild shop however, the MSDS sheet for this product was not found in the MSDS book.

Please ensure the latest version of this products MSDS sheet is available and that the people using this material have read and comply with its safety requirements.

Response: *The MSDS has been made available in the building.*

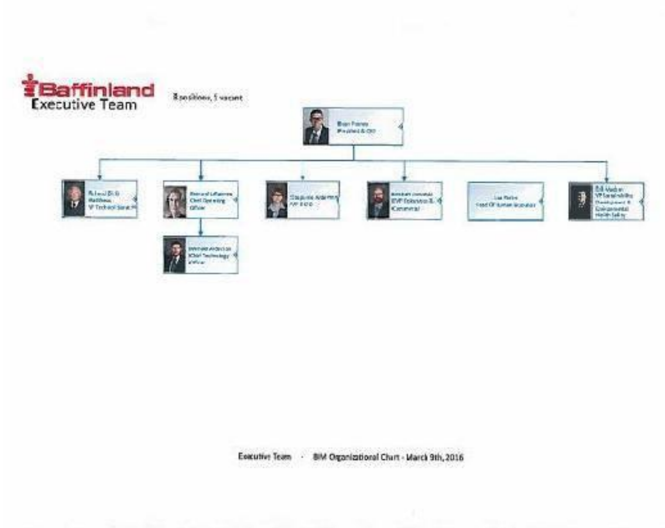
27. As a follow-up on the 28 May 2014 inspection report, the ore haul truck drivers were consulted for the areas along the Tote road where they do not have direct radio communication with the medic. They advised there are still problems at about the 30 and 60 km area of the Tote road.

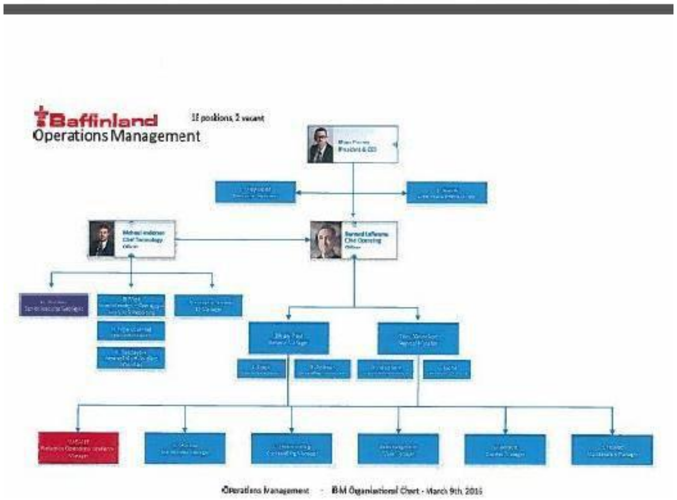
Please consult with the ore haul truck drivers to determine where along the Tote road they are unable to make direct radio contact with the medic and ensure these blind spots are corrected.

Response: *Install and program repeater. Target Completion Date: April 30, 2016*

28. Noticed a number of changes have occurred in Baffinland's organization

Please submit an up-to-date copy of Baffinland's organization chart





Response: *Org chart sent March 15, 2016*

Should you have any questions regarding this submission please contact Bernard Laflamme by phone at 647.253.0596 ext. 6091 or email at bernard.laflamme@baffinland.com .

Best Regards,

Bikash Paul
General Manager-Operations

cc. Bernard Laflamme
Erik Madsen
Tony Woodfine
Stephane Houde / Sandeep Kumar / Scot Klingmann / Lyle Hemmerling / Anant Minhas
Tony Noseworthy / Hal Finley
Fred Bailey - WSCC

WSCC Workers' Safety & Compensation Commission | ᐃᖅᑲᓇᐃᔮᖅᑎᓄᑦ ᐊᑦᑕᓇᖅᑐᓂᒃ ᐊᒻᒪ ᓇᓗᓕᐅᑲᒪᓂᒃ ᖃᐅᔨᓴᖅᑏᑦ

20160519

email Bernard.Laflamme@baffinland.com

Bernard Laflamme
Chief Operating Officer
Baffinland Iron Mines Corporation
2275 Upper Middle Road East - Suite 300
Oakville ON L6H 0C3

Dear Mr. Laflamme:

Further to the **Mine Health and Safety Act article 26** attached is my 20160519 Mary River project inspection report.

As per **MHSA article**

28. Please post a copy of this inspection report in a conspicuous location, and

29. Advise the chief inspector within 30 days of the remedial measures taken and the remedial measures still to be taken in respect of the inspection report.

32.(1) A person who is adversely affected by a decision or order issued by an inspector may appeal the decision or order, in writing, to the chief inspector within 30 days after its issue.

The WSCC is committed to service excellence. If you have any questions or concerns about this inspection report, please feel free to contact my supervisor Fred Bailey or myself. His phone number is 867 669 4430 or email fred.bailey@wscc.nt.ca.

Sincerely
Workers' Safety and Compensation Commission of the NWT and NU Mine Safety

Martin van Rooy
Engineer/Mines Inspector

cc OHSC c/o tony.noseworthy@baffinland.com

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Mine:	Mary River project	Location:	~950 km NW of Iqaluit		
Operator:	Baffinland Iron Mines Corp.	Lat.	71-19'N	Long.	79-24'W
Manager:	Bernard Laflamme	Inspection Date:		20160504 to 10	
Address	2275 Upper Middle Road East - Suite 300 Oakville ON L6H 0C3				

Martin van Rooy (engineer/mine inspector) conducted a general safety inspection of Baffinland's Milne Inlet and Mary River sites. He also performed a Safe Advantage audit of QIL and followed-up on two complaints received from site regarding ore haul truck brakes, wheels falling off the trailers, working of overtime and rest the period, after arrival on site on fly days.

At Milne Inlet:- the ore storage pad, site services shop, welding shop, Toromont's shop, Maintenance shop, site services garage, incinerator building, water treatment plant, Fountain tire's shop, Milne camp kitchen, Winterhaven camp kitchen, powerhouse and warehouse were checked.

At Mary River:- the ERT building, welding shop, maintenance shop, truck wash building, Toromont shop, crushing plants A, B and C, Winterhaven camp kitchen, E-House 7 and 9, incinerator building, site services garage, warehouse, component rebuild shop, water treatment plant, power plant electrical switch rooms 1 and 2, Mary River camp kitchen, laundry facilities and assay laboratory were checked.

Robert Bateman, Steve Campbell, Mark Ebenal, Darryl Finlay, Jerry Hodnett, Matthew Johnson, Brian Larson, Josh Manning, James McMath, Kenneth Mullen, Shawn Pattimore, Christopher Teske and Andrew Thornton, accompanied Martin van Rooy for parts of this inspection.

Noticed a person walking around the perimeter on top of the coarse product pile at Milne Inlet, he was surveying the pile.

1 Please consult with Baffinland's geotechnical consultant to ensure the pile is stable and will not slough or settle when ore is added or removed from the pile; trapping a person accessing the pile or walking on it.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the*

Date of Report 20160519 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

health and safety of employees and other persons at a mine.

MHSR sect 8.20. *Before a person is allowed to work close to or on top of a stockpile of unconsolidated material, the stockpile shall be*
(a) inspected for hazardous conditions by an authorized person; and
(b) made safe.

Noticed there were two STOP signs about 100 feet apart, on the main access road entering the ore storage pad at Milne.

2 Please remove one of the STOP signs to avoid confusion over where to stop for approval to enter the ore stockpile area.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed extension cords and air hoses lying indiscriminately across the floor of the Milne Inlet Fountain Tire shop

3 Please review the practice of allowing electrical cords, hoses and other items... to lie indiscriminately over the ground or across a floor without protection, creating a hazard.

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed an extension cord used to provide power to the following items
a) Herman Nelson heater in the Milne Inlet Fountain Tire shop

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

b) base station radio in the Milne Inlet site service shop.
c) steam tray in the Milne Inlet Winterhaven kitchen
d) breakfast griddle Mary River camp kitchen
e) buffer tank located in Mary River's assay laboratory

4 Please install an electrical outlet at the heater, radio, steam tray, breakfast griddle, buffer tank... and plug the equipment into the outlet and remove the extension cord.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed the Globe stand-up dough mixer in the Milne Inlet camp kitchen, is hard wired into the electrical circuit. The equipment must be locked-out for cleaning however, because the unit is hard wired into the electrical circuit, an electrician is required to lock it out at the electrical panel.

5 Please install an electrical out-let and plug on the Globe stand-up mixer to allow the kitchen staff to unplug the mixer for cleaning.

MHSR sect 10.21.(1) *The manager shall develop a lock-out procedure for each mechanical or electrical equipment system, and the procedure shall*
(a) include the requirements of subsections (2) to (6) and sections 10.22 and 10.23;
(b) address the sources of all hazards that may be presented when a person is working on the equipment or system; and
(c) specify, before the work starts, how the equipment or system is to be checked to verify that all hazards have been neutralized and that the equipment or system is safe to work on.

Noticed there is water on the floor below the Milne Inlet camp kitchen dishwasher.

6 Please repair the leaking dishwasher.

Date of Report 20160519 **Inspector** ____________

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed the welder working in the site service fixed plant shop at Milne and the welder(s) in the welding shop at Mary River had soot on their face. Each one confirmed that soot was present in a tissue when they blew their nose.

7 This is a repeat infraction see inspection reports 29 January 2016 and 12 October 2015. Please ensure people working in the welding shop at Milne Inlet and Mary River, wear their full-face mask pressurized respirator at all times while working in the welding shop area, to avoid breathing in the contaminated shop air.

MHSR sect 10.135.(10) *The manager shall ensure that persons are protected from fumes, gases, dust, vapours and noise produced during a welding, cutting, brazing or heating operation and that*
(a) where general ventilation at the work is not sufficient a local exhaust system is used to minimize the exposure by persons to airborne contaminants produced by the operation; and
(b) procedures are established to reduce noise levels for persons using welding, burning, cutting, brazing or heating equipment and for persons working in the vicinity.

Noticed there is no deadman switch in the wand of the Rigid Kallmann high-pressure hot water washer, in Milne Inlet site service fixed plant shop. Without the deadman switch safety device in the wand, the high-pressure (1750 psi) hot water (140 deg. F) must be shut-off manually at the pump.

8 Please replace the existing wand with a deadman switch equipped wand

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional

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engineer; and
(c) acceptable to the chief inspector.

Noticed an electrical panel with open slots located in a kitchen storage seacan at the Milne Inlet Winterhaven kitchen. However, the shelving units in the seacan blocks access to the panel.

9 Please remove the shelving in front of the electrical panel to provide 1m of clear access to the panel and close the open slots.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed the ground conductor is missing from the cable tray located between electrical panels 2540 PNL-001A and 2540 PNL-004B in the Milne Inlet incinerator building.

10 Please install a ground conductor in the cable tray.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed the single line electrical distribution schematics in the electrical rooms at Milne Inlet and at Mary River are stamped ***For Reference – Not for Construction***

11 Please remove these electrical schematics and replace them with the certified ***As Built*** electrical schematics.

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed the expansion bellow, on the exhaust system of the Milne Inlet diesel fire pump, is extensively stretched and it appears to be beyond the design limit of the bellow.

12 Please check the design limit of the expansion bellows and install a spacer in the exhaust system to release the strain on the bellow.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Noticed there is no berm along the Tote Road at the drop-off at km 40 and at km 52, to prevent a vehicle from going off the road and losing control.

13 Please install berms or barriers at the drop-off located at km 40, km 52 and at other locations along the Tote Road where a vehicle going of the road could loose control.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed the vee-belt guard is missing from the vibrating feeder drive at crushing plant 'A' feed hoper.

14 Please replace the missing vee-belt drive guard to prevent contact with the moving parts and to contain a loose or broken vee-belt.

Date of Report 20160519 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 10.16. *Every*
(a) drive belt, chain, rope or cable,
(b) pulley, sprocket, flywheel or geared wheel,
(c) opening through which any belt, pulley or wheel operates,
(d) bolt, key or set screw,
(e) revolving, reciprocating or relative motion part,
(f) item projecting from a surface, and
(g) counter or tension weight unit and travel path,
and every other item that has motion or relative motion or is hot or electrically energized shall, unless it is so situated as to prevent a person from coming into accidental contact with it, be effectively enclosed, covered or guarded.

Noticed there is no barrier installed for the exposed tail pulley of the conveyor below the vibrating feeder of crusher 'A' and there are no barriers installed to prevent access by a persons to the missing belt conveyor nip-point guards at crushing and screening plant 'A', 'B' and 'C'.

15 This is a repeat infraction see inspection report 29 January 2016. Please install barricades at the crushing and screening plant 'A', 'B' and 'C' to prevent access to the moving conveyor parts or install nip-point guards.

MHSR sect 10.118.(3) *All accessible head, tail, drive and tension pulleys of a conveyor shall be effectively guarded at their nip points and the guards shall extend for a distance of at least 1 m from the nip point.*

Noticed there is a layer of dust present on the floor and on the vertical surfaces of crusher control room 'A'. The crushing plant operator advised he had cleaned the control room earlier in his shift. The dust in the control room is a concern, as the operator is not wearing a respirator for protection from breathing in the dust-contaminated air, in the control room. There is also a large plume of dust coming from crushing and screening plant 'C'; however, the men working in this area are not wearing respirators for protection from breathing in the dust-contaminated air.

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

16 The requirement for the crushing and screening plant operators to wear respirators for protection from the dust was previously noted see inspection reports 21 March 2015, 26 July 2014 and 28 May 2014. Please ensure the crushing and screening plant personnel wear a full-face pressurized respirator (some have beards) for protection from the dust in the air, when the crushing plant is running.

MHSR sect 9.02.(1) *Employees shall not be exposed to airborne concentrations of chemical or physical substances in excess of those specified in the 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices published by the American Conference of Governmental Industrial Hygienists.*

(2) *Where shifts are worked longer than eight hours a day or more than 40 hours a week, the airborne concentration of chemical and physical substances shall not exceed the threshold limit value established under the formula set out in Schedule 4.*

Noticed a long extension cord run from crusher 'C' electrical room through the door, through the water to a heater servicing a seacan workshop installed at crusher 'C'. The extension cord was removed during our inspection.

17 Please install an outdoor electrical outlet at the heater and plug the heater directly into the electrical outlet

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed a fire extinguisher was standing on the floor of Toromont shop at Mary River.

18 Please ensure all fire extinguishers are hung-up and not set on a flat surface where moisture may collect, corroding the bottom of the extinguisher.

Date of Report 20160519 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 12.16.(1) *The manager shall ensure that all fire fighting equipment provided at the mine is maintained by an authorized person.*

(2) *The manager shall ensure that all fire fighting equipment provided at the mine is inspected by an authorized person at least once each month and that the results of the inspection are*
(a) noted on the fire fighting equipment's tag;
(b) entered in a logbook kept for that purpose; or
(c) entered in the mobile equipment logbook.

Noticed the floor of production drill DRL007 cab was relatively clean however, the inside of the half mask respirator, hanging on the wall in the cab, is coated with a layer of dust.

19 Please install a good vacuum cleaner in each drill cab, to assist the operator in keeping his clothing and work area free of drill dust.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed the Caterpillar 930 loader in Nuna's shop was under repair however, it was not locked-out and it had no wheel chocks applied, to prevent unintended movement.

20 Please ensure all contractors on site comply with Baffinland's lockout procedure and apply wheel chocks to prevent unintended movement, of parked equipment.

MHSA art 15. *Where a contractor performs work at a mine, the contractor, the employee or officer of the contractor in charge of the work of the contractor at the mine and the owner and manager of the mine shall, in respect of the work of the contractor at the mine,*
(a) take every reasonable measure and precaution to protect the health and safety of employees of the contractor, employees of the mine and other persons at the mine; and
(b) comply with, and ensure that other persons comply with, this Act and the regulations and any applicable orders or directives issued under this Act or the regulations.

Date of Report 2016 05 19 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the high-pressure hose of the Hotsy high-pressure (2500 psi) hot water (250 deg. F) was being extended with a length of extra hose however, the work was stopped as the fittings used; black iron, brass... are not designed for this high-pressure.

21 Please ensure no person modifies high-pressure, hot or cold water, washing equipment without the approval of the manufacturer or the approval of a professional engineer.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

MHSR sect 10.97.(2) *A boiler, compressor or pressure vessel to which the Boiler and Pressure Vessels Act and the regulations under that Act do not apply shall be maintained in a proper and safe condition by a qualified person.*

Noticed there is no fall protection provided on the vertical access ladder to the rough terrain Grove and Terex crane parked at Mary River. This is a concern as the deck is about 7 feet above the ground and therefore it should have guarding.

22 Please review the operation of all the cranes on site and ensure fall protection is provided to prevent a person on or in the crane from falling to a lower level.

MHSR sect 1.98. *Except in an underground mine, a ladderway at an angle steeper than 70 to the horizontal shall be fixed in place and be provided with*
(a) platforms at intervals not greater than 7 m;
(b) a safety cage; or
(c) a protective device that, when used, will prevent a worker from falling.

Date of Report 20160519 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 1.91. *The manager shall provide every walkway and every working platform more than 1.5 m above the ground with*
(a) a handrail not less than 910 mm nor more than 1.07 m above the floor of the walkway or platform;
(b) a second rail placed at mid-point between the top rail and the floor of the walkway or platform, unless the space between the top rail and the floor is closed by a screen; and
(c) toeboards that extend from the floor to a height of not less than 100 mm.

Noticed there is nearly a 90 deg. bend in the electric cable attached to the electrical panel in the site service change room. The panel also has some open breaker slots allowing access to the energized parts.

23 Please realign the electrical cable and cover the open breaker slots in the electrical panel.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed at Milne Inlet and at Mary River a homemade frame used to support the front end of the ore haul trailers. However, there is no information on the frame, to indicate the maximum safe load limit that may be applied to the frame.

24 Please ensure before using these homemade frames, a professional engineer certifies the maximum safe load that may be applied to the frame and record it on the frame.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Noticed there is a small diesel engine crane operating in the Mary River maintenance shop.

Date of Report 20160519 **Inspector** [signature]

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25 Please check the exhaust of this crane and ensure it is equipped with an exhaust gas scrubber.

MHSR sect 10.59.(4) *No diesel or propane powered vehicle or equipment shall be operated inside a building for the purpose of servicing the vehicle unless it is equipped with a exhaust gas scrubber acceptable to an inspector.*

Noticed the materials stored in the Mary River laundry electrical room

26 Please remove the stored material from the electrical room and maintain it free from trip and fire hazards

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed some furnace covers in the Mary River kitchen complex, are removed.

27 Please ensure the furnace cover is replaced on a furnace after it has been removed.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Noticed a small air receiver referred to as a buffer tank, located in the assay laboratory. This air receiver is feed from a larger Champion air compressor however, it is not clear if the small pressure relieve valve

Date of Report 20160519 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

on the buffer tank, can handle the volume of compressed air output from Champion compressor.

28 Please check and ensure that the pressure relieve valve on the buffer tank when tripped, can handle the full volume of compressed air output from the Campion compressor.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Noticed the Champion air compressor and receiver installed in the Assay Laboratory however, it is not clear if the unit is CSA approved.

29 Please submit a copy of the Nunavut boiler and pressure vessel permit for this unit

MHSR sect 10.97.(1) *Boilers, compressors and pressure vessels and associated piping and fittings shall be installed and maintained in accordance with CSA Standard B51-95, Boiler, Pressure Vessel and Pressure Piping Code, and the heated or refrigerated fluid plant shall comply with the requirements of the Boiler and Pressure Vessels Act and the regulations under that Act.*

The complaints received from site regarding ore haul truck brakes, wheels falling off the trailers... were checked and it was found Baffinland is addressing these maintenance problem. However, the rest period, after arrival on site on fly days, is a problem i.e. the Milne Inlet day shift crew on Tuesday May 3 arrived at Milne about 1:30 am May 4 and some of these people were scheduled to start work at 4 am.

30 Please ensure a sufficient rest period is provided to a person after their arrival on site and before they are required to report for work and submit a copy of Baffinland's procedure for travel delay.

MHSA art 2.(1) *The owner of a mine shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at the mine.*

Date of Report 20160519 **Inspector** [signature]

Baffinland

20160613

Martin van Rooy
Engineer/Mines Inspector
WSCC
Iqaluit, Nunavut

Dear Mr. van Rooy:

Further to 20160519 Mary River project inspection report, please see our response to your inspection.

Bikash Paul
General Manager

Mine:	Mary River project	Location:	~950 km NW of Iqaluit
Operator:	Baffinland Iron Mines Corp.	Lat. 71-19'N	Long. 79-24'W
Manager:	Sylvain Proulx	Inspection Date:	20160504 to 10
Address	2275 Upper Middle Road East - Suite 300 Oakville ON L6H 0C3		

Noticed a person walking around the perimeter on top of the coarse product pile at Milne Inlet, he was surveying the pile.

1 Please consult with Baffinland's geotechnical consultant to ensure the pile is stable and will not slough or settle when ore is added or removed from the pile; trapping a person accessing the pile or walking on it.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

MHSR sect 8.20. *Before a person is allowed to work close to or on top of a stockpile of unconsolidated material, the stockpile shall be*
(a) inspected for hazardous conditions by an authorized person; and
(b) made safe.

Response: Please find attached a technical memorandum from our geotechnical consultant regarding the stockpile stability and an inspection form to be used when accessing the stockpile.

Completion: June 05 2016

Noticed there were two STOP signs about 100 feet apart, on the main access road entering the ore storage pad at Milne.

2 Please remove one of the STOP signs to avoid confusion over where to stop for approval to enter the ore stockpile area.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Response:

The stop sign has been removed. Completion: June 12 2016

Noticed extension cords and air hoses lying indiscriminately across the floor of the Milne Inlet Fountain Tire shop

3 Please review the practice of allowing electrical cords, hoses and other items... to lie indiscriminately over the ground or across a floor without protection, creating a hazard.

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed an extension cord used to provide power to the following items
a) Herman Nelson heater in the Milne Inlet Fountain Tire shop
b) base station radio in the Milne Inlet site service shop.
c) steam tray in the Milne Inlet Winterhaven kitchen

d) breakfast griddle Mary River camp kitchen
e) buffer tank located in Mary River's assay laboratory

Response: These items will be complete June 30, 2016

4 Please install an electrical outlet at the heater, radio, steam tray, breakfast griddle, buffer tank... and plug the equipment into the outlet and remove the extension cord.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

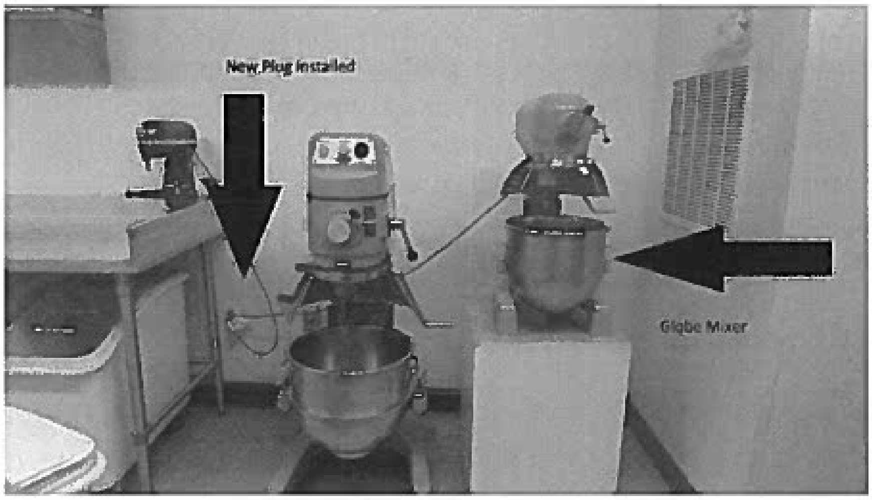
Response: This item is scheduled to be completed July 31, 2016

Noticed the Globe stand-up dough mixer in the Milne Inlet camp kitchen, is hard wired into the electrical circuit. The equipment must be locked-out for cleaning however, because the unit is hard wired into the electrical circuit, an electrician is required to lock it out at the electrical panel.

5 Please install an electrical out-let and plug on the Globe stand-up mixer to allow the kitchen staff to unplug the mixer for cleaning.

MHSR sect 10.21.(1) *The manager shall develop a lock-out procedure for each mechanical or electrical equipment system, and the procedure shall*
(a) include the requirements of subsections (2) to (6) and sections 10.22 and 10.23;
(b) address the sources of all hazards that may be presented when a person is working on the equipment or system; and
(c) specify, before the work starts, how the equipment or system is to be checked to verify that all hazards have been neutralized and that the equipment or system is safe to work on.

Response: The Globe stand up mixer now has a plug installed. Completion: June 09 2016



Noticed there is water on the floor below the Milne Inlet camp kitchen dishwasher.

6 Please repair the leaking dishwasher.

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Response: There is a seal that needs to be replaced on the dishwasher. The seal is ordered. Expected completion date is July 31, 2016

Noticed the welder working in the site service fixed plant shop at Milne and the welder(s) in the welding shop at Mary River had soot on their face. Each one confirmed that soot was present in a tissue when they blew their nose.

7 This is a repeat infraction see inspection reports 29 January 2016 and 12 October 2015. Please ensure people working in the welding shop at Milne Inlet and Mary River, wear their full-face mask pressurized respirator at all times while working in the welding shop area, to avoid breathing in the contaminated shop air.

MHSR sect 10.135.(10) *The manager shall ensure that persons are protected from fumes, gases, dust, vapours and noise produced during a welding, cutting, brazing or heating operation and that*
(a) where general ventilation at the work is not sufficient a local exhaust system is used to minimize the exposure by persons to airborne contaminants produced by the operation; and
(b) procedures are established to reduce noise levels for persons using welding, burning, cutting, brazing or heating equipment and for persons working in the vicinity.

Response: These respirators are ordered. Expected completion date is July 31, 2016

Noticed there is no deadman switch in the wand of the Rigid Kallmann high-pressure hot water washer, in Milne Inlet site service fixed plant shop. Without the deadman switch safety device in the wand, the high-pressure (1750 psi) hot water (140 deg. F) must be shut-off manually at the pump.

8 Please replace the existing wand with a deadman switch equipped wand.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Response: This unit has been taken out of service. Completion: May 15, 2016

Noticed an electrical panel with open slots located in a kitchen storage seacan at the Milne Inlet Winterhaven kitchen. However, the shelving units in the seacan blocks access to the panel.

9 Please remove the shelving in front of the electrical panel to provide 1m of clear access to the panel and close the open slots.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Response: this item is scheduled to be completed June 30, 2016

Noticed the ground conductor is missing from the cable tray located between electrical panels 2540 PNL-001A and 2540 PNL-004B in the Milne Inlet incinerator building.

10 Please install a ground conductor in the cable tray.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Response: expected completion date June 30 2016

Noticed the single line electrical distribution schematics in the electrical rooms at Milne Inlet and at Mary River are stamped ***For Reference – Not for Construction***

11 Please remove these electrical schematics and replace them with the certified ***As Built*** electrical schematics.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

This item is expected to be complete September 31, 2016

Noticed the expansion bellow, on the exhaust system of the Milne Inlet diesel fire pump, is extensively stretched and it appears to be beyond the design limit of the bellow.

12 Please check the design limit of the expansion bellows and install a spacer in the exhaust system to release the strain on the bellow.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and

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(c) acceptable to the chief inspector.

Response: We need an engineering solution to this problem. Expected completion date is July 31, 2016

Noticed there is no berm along the Tote Road at the drop-off at km 40 and at km 52, to prevent a vehicle from going off the road and losing control.

13 Please install berms or barriers at the drop-off located at km 40, km 52 and at other locations along the Tote Road where a vehicle going of the road could loose control.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Response: Expected completion date is June 30, 2016

Noticed the vee-belt guard is missing from the vibrating feeder drive at crushing plant 'A' feed hoper.

14 Please replace the missing vee-belt drive guard to prevent contact with the moving parts and to contain a loose or broken vee-belt.

MHSR sect 10.16. *Every*
(a) drive belt, chain, rope or cable,
(b) pulley, sprocket, flywheel or geared wheel,
(c) opening through which any belt, pulley or wheel operates,
(d) bolt, key or set screw,
(e) revolving, reciprocating or relative motion part,
(f) item projecting from a surface, and
(g) counter or tension weight unit and travel path,
and every other item that has motion or relative motion or is hot or electrically energized shall, unless it is so situated as to prevent a person from coming into accidental contact with it, be effectively enclosed, covered or guarded.

Response: The guard has been replaced on the vee-belt drive guard. Completion: June 05, 2016

Noticed there is no barrier installed for the exposed tail pulley of the conveyor below the vibrating feeder of crusher 'A' and there are no barriers installed to prevent access by a persons to the missing belt conveyor nip-point guards at crushing and screening plant 'A', 'B' and 'C'.

15 This is a repeat infraction see inspection report 29 January 2016. Please install barricades at the crushing and screening plant 'A', 'B' and 'C' to prevent access to the moving conveyor parts or install nip-point guards.

MHSR sect 10.118.(3) *All accessible head, tail, drive and tension pulleys of a conveyor shall be effectively guarded at their nip points and the guards shall extend for a distance of at least 1 m from the nip point.*

Response: Barriers have been erected to prevent access to moving conveyor parts. Date completed June 07, 2016

Noticed there is a layer of dust present on the floor and on the vertical surfaces of crusher control room 'A'. The crushing plant operator advised he had cleaned the control room earlier in his shift. The dust in the control room is a concern, as the operator is not wearing a respirator for protection from breathing in the dust-contaminated air, in the control room. There is also a large plume of dust coming from crushing and screening plant 'C'; however, the men working in this area are not wearing respirators for protection from breathing in the dust-contaminated air.

16 The requirement for the crushing and screening plant operators to wear respirators for protection from the dust was previously noted see inspection reports 21 March 2015, 26 July 2014 and 28 May 2014. Please ensure the crushing and screening plant personnel wear a full-face pressurized respirator (some have beards) for protection from the dust in the air, when the crushing plant is running.

Response: Completion date July 31, 2016

MHSR sect 9.02.(1) *Employees shall not be exposed to airborne concentrations of chemical or physical substances in excess of those specified in the 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices published by the American Conference of Governmental Industrial Hygienists.*

(2) *Where shifts are worked longer than eight hours a day or more than 40 hours a week, the airborne concentration of chemical and physical substances shall not exceed the threshold limit value established under the formula set out in Schedule 4.*

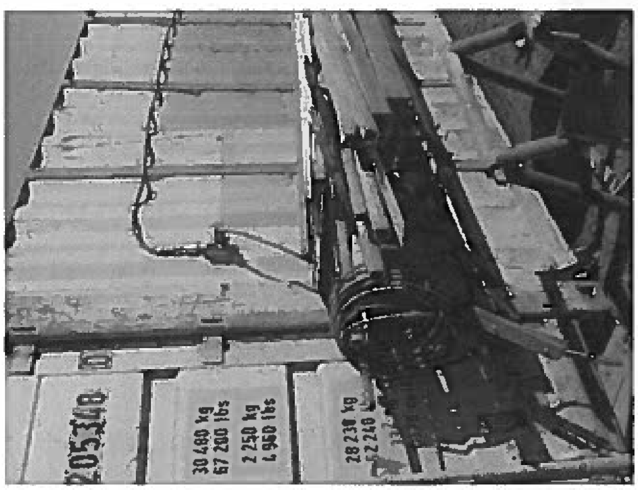
Response:

Noticed a long extension cord run from crusher 'C' electrical room through the door, through the water to a heater servicing a seacan workshop installed at crusher 'C'. The extension cord was removed during our inspection.

17 Please install an outdoor electrical outlet at the heater and plug the heater directly into the electrical outlet

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Response: The extension cord has been removed and an outside plug in has been installed. Also a sign has been placed on the door.



Noticed a fire extinguisher was standing on the floor of Toromont shop at Mary River.

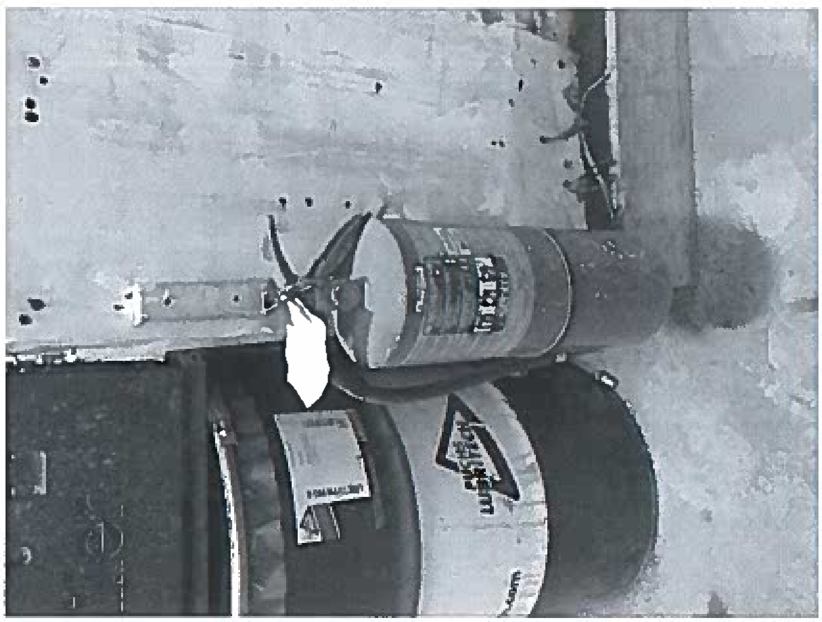
18 Please ensure all fire extinguishers are hung-up and not set on a flat surface where moisture may

collect, corroding the bottom of the extinguisher.

MHSR sect 12.16.(1) *The manager shall ensure that all fire fighting equipment provided at the mine is maintained by an authorized person.*

(2) *The manager shall ensure that all fire fighting equipment provided at the mine is inspected by an authorized person at least once each month and that the results of the inspection are*
(a) noted on the fire fighting equipment's tag;
(b) entered in a logbook kept for that purpose; or
(c) entered in the mobile equipment logbook.

Response: The fire extinguisher has been hung on the wall. Completion date: June 12, 2016



Noticed the floor of production drill DRL007 cab was relatively clean however, the inside of the half mask respirator, hanging on the wall in the cab, is coated with a layer of dust.

19 Please install a good vacuum cleaner in each drill cab, to assist the operator in keeping his clothing and work area free of drill dust.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Response: Vacuum cleaners will be ordered and this will be completed July 31, 2016

Noticed the Caterpillar 930 loader in Nuna's shop was under repair however, it was not locked-out and it had no wheel chocks applied, to prevent unintended movement.

20 Please ensure all contractors on site comply with Baffinland's lockout procedure and apply wheel chocks to prevent unintended movement, of parked equipment.

MHSA art 15. *Where a contractor performs work at a mine, the contractor, the employee or officer of the contractor in charge of the work of the contractor at the mine and the owner and manager of the mine shall, in respect of the work of the contractor at the mine,*
(a) take every reasonable measure and precaution to protect the health and safety of employees of the contractor, employees of the mine and other persons at the mine; and
(b) comply with, and ensure that other persons comply with, this Act and the regulations and any applicable orders or directives issued under this Act or the regulations.

Response: All contractors have received training on BIM Zero Energy Isolation Procedure and on wheel chocking and safety coordinators are doing cyclical audits of all areas to ensure compliance.

Completion: May 14, 2016

Noticed the high-pressure hose of the Hotsy high-pressure (2500 psi) hot water (250 deg. F) was being extended with a length of extra hose however, the work was stopped as the fittings used; black iron, brass... are not designed for this high-pressure.

21 Please ensure no person modifies high-pressure, hot or cold water, washing equipment without the approval of the manufacturer or the approval of a professional engineer.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and

(c) acceptable to the chief inspector.

Response: This unit has been taken out of service. Parts have been ordered per manufactures specifications and will be returned to service once parts arrive.

MHSR sect 10.97.(2) *A boiler, compressor or pressure vessel to which the Boiler and Pressure Vessels Act and the regulations under that Act do not apply shall be maintained in a proper and safe condition by a qualified person.*

Noticed there is no fall protection provided on the vertical access ladder to the rough terrain Grove and Terex crane parked at Mary River. This is a concern as the deck is about 7 feet above the ground and therefore it should have guarding.

22 Please review the operation of all the cranes on site and ensure fall protection is provided to prevent a person on or in the crane from falling to a lower level.

MHSR sect 1.98. *Except in an underground mine, a ladderway at an angle steeper than 70 to the horizontal shall be fixed in place and be provided with*
(a) platforms at intervals not greater than 7 m;
(b) a safety cage; or
(c) a protective device that, when used, will prevent a worker from falling.

MHSR sect 1.91. *The manager shall provide every walkway and every working platform more than 1.5 m above the ground with*
(a) a handrail not less than 910 mm nor more than 1.07 m above the floor of the walkway or platform;
(b) a second rail placed at mid-point between the top rail and the floor of the walkway or platform, unless the space between the top rail and the floor is closed by a screen; and
(c) toeboards that extend from the floor to a height of not less than 100 mm.

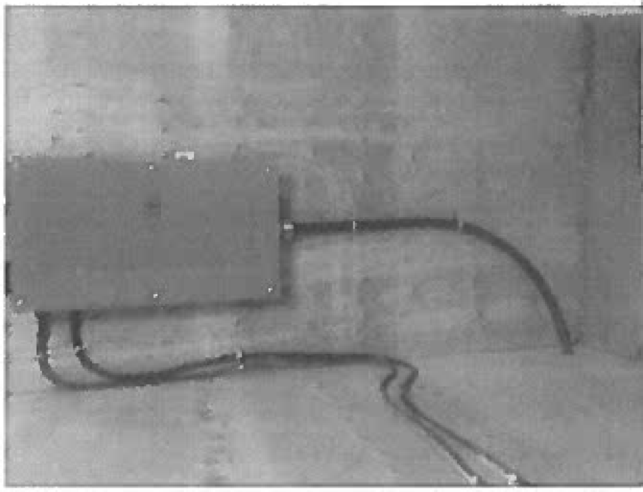
Response: We will require engineering support for this order. Expected completion August 31, 2016

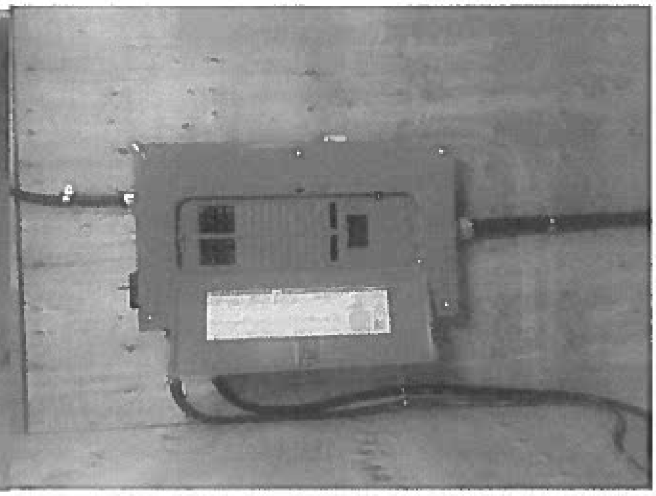
Noticed there is nearly a 90 deg. bend in the electric cable attached to the electrical panel in the site service change room. The panel also has some open breaker slots allowing access to the energized parts.

23 Please realign the electrical cable and cover the open breaker slots in the electrical panel.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Response: this item is complete. June 13, 2016





Noticed at Milne Inlet and at Mary River a homemade frame used to support the front end of the ore haul trailers. However, there is no information on the frame, to indicate the maximum safe load limit that may be applied to the frame.

24 Please ensure before using these homemade frames, a professional engineer certifies the maximum safe load that may be applied to the frame and record it on the frame.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Response: Please see the attached engineer drawings for the stands. Complete June 12, 2016

Noticed there is a small diesel engine crane operating in the Mary River maintenance shop.

25 Please check the exhaust of this crane and ensure it is equipped with an exhaust gas scrubber.

MHSR sect 10.59.(4) *No diesel or propane powered vehicle or equipment shall be operated inside a building for the purpose of servicing the vehicle unless it is equipped with a exhaust gas scrubber acceptable to an inspector.*

Response: Scrubber is ordered. Expected completion date September 30, 2016

Noticed the materials stored in the Mary River laundry electrical room

26 Please remove the stored material from the electrical room and maintain it free from trip and fire hazards

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Response: Materials have been removed from the electrical room. Completed June 12, 2016.

Noticed some furnace covers in the Mary River kitchen complex, are removed.

27 Please ensure the furnace cover is replaced on a furnace after it has been removed.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Response: Covers have been replaced. Completed June 12, 2016

Noticed a small air receiver referred to as a buffer tank, located in the assay laboratory. This air receiver is feed from a larger Champion air compressor however, it is not clear if the small pressure relieve valve on the buffer tank, can handle the volume of compressed air output from Champion compressor.

Response: Expected completion date June 30, 2016

28 Please check and ensure that the pressure relieve valve on the buffer tank when tripped, can handle the full volume of compressed air output from the Campion compressor.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Noticed the Champion air compressor and receiver installed in the Assay Laboratory however, it is not clear if the unit is CSA approved.

Response: Please see response regarding this order named WSCC inspection ALS lab.

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29 Please submit a copy of the Nunavut boiler and pressure vessel permit for this unit

MHSR sect 10.97.(1) *Boilers, compressors and pressure vessels and associated piping and fittings shall be installed and maintained in accordance with CSA Standard B51-95, Boiler, Pressure Vessel and Pressure Piping Code, and the heated or refrigerated fluid plant shall comply with the requirements of the Boiler and Pressure Vessels Act and the regulations under that Act.*

Response: expected completion date June 30, 2016

The complaints received from site regarding ore haul truck brakes, wheels falling off the trailers... were checked and it was found Baffinland is addressing these maintenance problem. However, the rest period, after arrival on site on fly days, is a problem i.e. the Milne Inlet day shift crew on Tuesday May 3 arrived at Milne about 1:30 am May 4 and some of these people were scheduled to start work at 4 am.

30 Please ensure a sufficient rest period is provided to a person after their arrival on site and before they are required to report for work and submit a copy of Baffinland's procedure for travel delay.

MHSA art 2.(1) *The owner of a mine shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at the mine.*

Response: Please find attached a copy of BIM hours of work policy. Complete June 12, 2016

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20160720

email Sylvain.Proulx@baffinland.com

Sylvain Proulx
Chief Operating Officer
Baffinland Iron Mines Corporation
2275 Upper Middle Road East - Suite 300
Oakville ON L6H 0C3

Dear Mr. Proulx:

Further to the **Mine Health and Safety Act article 26** attached is the 20160720 Mary River project electrical inspection report.

As per **MHSA article**

28. Please post a copy of this inspection report in a conspicuous location, and

29. Advise the chief inspector within 30 days of the remedial measures taken and the remedial measures still to be taken in respect of the inspection report.

32.(1) A person who is adversely affected by a decision or order issued by an inspector may appeal the decision or order, in writing, to the chief inspector within 30 days after its issue.

The WSCC is committed to service excellence. If you have any questions or concerns about this inspection report, please feel free to contact my supervisor Fred Bailey or myself. His phone number is 867 669 4430 or email fred.bailey@wscc.nt.ca.

Sincerely
Workers' Safety and Compensation Commission of the NWT and NU Mine Safety

Martin van Rooy
Engineer/Mines Inspector

cc OHSC c/o tony.noseworthy@baffinland.com hal.finely@baffinland.com

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Mine:	Mary River project	Location:	~950 km NW of Iqaluit		
Operator:	Baffinland Iron Mines Corp.	Lat.	71-19'N	Long.	79-24'W
Manager:	Sylvain Proulx	Inspection Date:		2016012 to 15	
Address	2275 Upper Middle Road East - Suite 300 Oakville ON L6H 0C3				

A general electrical safety inspection was conducted by Mr. J. Fuller, WSCC's electrical consultant, of Baffinland's Milne Inlet and Mary River sites. Mr. Martin van Rooy, WSCC's engineer/mine inspector, was to accompany Mr. Fuller for this inspection however; bad weather in Iqaluit prevented his flight. Mr. Fullers report '*Baffinland Iron Mines – Mary River and Milne Inlet Electrical Inspection*' is attached for information.

Neil Robinson at Milne Inlet and Steve Gogo at Mary River accompanied Mr. Fuller.

Noticed no single line electrical diagram was posted on the wall of Milne Power House B.

1 Please post an up-to-date single line at this Power House.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA -M421 -93, Use of Electricity in Mines*

Some electrical equipment at Milne Inlet and at Mary River, are equipped with molded case breakers however, the adaptor for locking out the breaker, is not present in the electrical room.

2 Please ensure where molded case breakers are used, the lock out station has the adapters for locking out the molded case breakers.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed clutter or storage in front of electrical distribution panels at Milne's 1) Mobile Equipment

Date of Report 20160720 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Maintenance Shop, 2) Mine Rescue Team Building, and 3) Batch Plant.,

3 This is a repeat infraction see inspection report 21 March 2015... Please instruct all supervisors to check all electrical distribution panels in their area routinely, to ensure at least one meter clear working space, free of clutter is maintain around the electrical equipment.

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

MHSR sect 5.07. *Every shift boss or supervisor shall, within his or her area of responsibility and authority,*
(e) be knowledgeable about essential safeguards against hazards and about safe working procedures at the worksites for which he or she is responsible so that he or she can routinely assess the safety of the environment and operations affecting persons in those worksites;

Noticed the fire alarm panel at the Milne Mobile Equipment Maintenance Shop and at the Welding Shop are not active.

4 Please determine if fire detection in these areas is necessary and either remove or activate the installed fire alarm panels.

MHSR sect 12.01.(1) *The manager shall ensure that a fire risk assessment is carried out not later than March 31 in each calendar year for all parts of the mine, both underground and surface, and the assessment shall*
(c) identify the need for fire protection and the type of fire protection that should be provided; and
(d) set out measures to be taken to reduce the hazard from fire, including
(i) equipment design,
(ii) adequate maintenance of equipment,
(iii) proper training,

Date of Report 20160720 **Inspector** ___________

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

(iv) evacuation procedures,
(v) use of detection and early fire warning devices,
(vi) type of fire suppression equipment, and
(vii) means of egress from a worksite.

Noticed a personal protection lock left on 1) Panel 2521.2-2A-500 at the Milne Welding shop, 2) on the out of service feeder cable for the wash car fed from the Milne BIM Project Office, and 3) for the long term locking and tagging at panel 2513-PNL-002A in the Milne Mine Rescue Team Building. Personal protection locks should only be used for personal protection when the worker is present and should be removed at end of shift.

5 Please review the Baffinland lockout and tagging procedure and ensure the long-term or out-of-service equipment lockout is addressed and complied with.

MHSR sect 10.21.(1) *The manager shall develop a lock-out procedure for each mechanical or electrical equipment system, and the procedure shall*
(a) include the requirements of subsections (2) to (6) and sections 10.22 and 10.23;
(b) address the sources of all hazards that may be presented when a person is working on the equipment or system; and
(c) specify, before the work starts, how the equipment or system is to be checked to verify that all hazards have been neutralized and that the equipment or system is safe to work on.

Noticed the cables between the Milne Toromont Shop and Office are not secured and protected.

6 Please secure and protect the electrical cables between the Toromont shop and office.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the Teck cable between the main 600V switch and the splitter at the Milne Toromont shop is bent well beyond acceptable minimum radius.

Date of Report 2016 07 20 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

7 Please re-serve the Teck cable in accordance with the Canadian Electrical Code.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the electrical panel of the furnace on the South wall of the Milne Toromont Shop, is damaged preventing the panel door from closing.

8 Please repair the enclosure to restore its rating and permit the door to be closed or replace the enclosure.

Noticed some movable generators are installed without a ground 1) PDG 017 at the ship loader office, 2) the 20kW unit at the Mine 110 laydown area, and 3) the unit at the Mine 110 Communications Sea Can

9 Please Install grounding in accordance with CSA M421-11 Clause 4.4.5.2.2.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed some of the electrical cables at the movable generators, are placing a strain on their connectors/terminations.

10 Please provide a means of securing the cables at movable generators, to remove the strain from connectors/terminations.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed an extension cord is used to supply power to the heat tracing on the sewage line at the ship loader office.

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

11 Please hardwire the heat trace cable with Teck cable.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed there is an out-of-service feeder cable for the wash car fed from the Milne BIM Project Office Sea can.

12 Please remove the out-of-service feeder cable for the wash car fed from the Milne BIM Project Office Sea can or identify and insulate the end(s).

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the disconnect switches at Milne's Sewage Truck Storage Building, are not accessible from the floor.

13 Please make the distribution panel readily accessible with at least one-meter clear working space.

MHSR sect 1.90. *Where workers are required to work, operate, maintain or service equipment, a safe means of access shall be provided as required by section 1.89.*

Noticed a portable heater and portable compressor fed by an extension cord, located on the access platform for the Milne Mine Rescue Team Building distribution.

14 Please remove the portable heater and portable compressor from the access platform so as not to interfere with electrical equipment access.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the main electrical control panel at the Milne Water Treatment Plant, is on a noticeable slant

Date of Report 20160720 **Inspector** [signature]

because the wooden floor it is attached to, has subsided.

15 Please re-block the platform and ensure that anchoring for this platform is adequate given the increased lean of this panel.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Noticed the sensor on top of the fire pump's diesel tank at the Milne Water Treatment Plant, is bent by a sagged water line because of the subsiding floor.

16 Please secure the water line and repair the sensor.

MHSR sect 10.01.(1) *All mechanical equipment... ...acceptable to the chief inspector.*

Noticed computer power bars used for shop extension cords at the Milne Batch Plant. As noted in previous inspection reports, these devices are not designed for high current loads.

17 Please install electrical outlets for plugging in the equipment and remove the power bars.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the mechanical interlock on the welding receptacle disconnect switch 2521.1 WPD 504 at the Milne Batch Plant, is broken.

18 Please replace the mechanism and restore to proper operation.

Date of Report 2016 07 20 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the access door of the main 600V termination lugs on the portable generators used on the ore pad, is not locked, providing easy access to the live terminals.

19 Please lock or bolt the electrical enclosures to prevent access to the live terminals without the use of tool and post on the access doors, the highest voltage present in the cabinet.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the e-stops on the ship loader and on the reclaim conveyor do not operate when the pull cord is pulled toward the switch.

20 This is a repeat infraction see inspection report 12 October 2015, please ensure pull cords are checked routinely to ensure the e-stop activates for all directions of pull on the cord.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the flags on the above-mentioned e-stops are seized and do not operate when the e-stop trips.

21 Please free up the flags and ensure they operate at the same time as conducting the pull cord tests.

MHSR sect 10.01.(1) *All mechanical equipment... ...acceptable to the chief inspector.*

Noticed the protection relay on breaker H-411 (Crusher 8B Feeder) at the Mary River Power House 2 does not have a test sticker.

22 Please ensure that the relay was tested and apply a sticker to the relay indicating when the relay was tested. Provide evidence of the testing.

Date of Report 2016 07 20 **Inspector** [signature]

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the insulating gloves stored in cardboard boxes at Mary River Power House 2.

23 Please relocate the insulating gloves to another suitable storage location or provide metal storage cabinets for storage of the gloves and ensure combustible materials are eliminated from switch rooms to the greatest extent possible.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed a few items, not directly associated with the operation and maintenance of the E-Houses at Mary River, stored in the E-Houses

24 Please remove these items.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed a lockout station is provided in some Mary River E-houses, others have lockout stations that have not yet been installed.

25 Please install a lockout station in each E-house at Mary River and Milne and include adapters for locking molded case breaker toggles where applicable

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed the Twin Pack batteries in Mary River's E-House 1, are badly corroded.

Date of Report 20160720 **Inspector** [signature]

Box 8888 • Yellowknife, NT X1A 2R3 • Telephone: (867) 920-3888 • Toll Free: 1-800-661-0792 • Fax: (867) 873-4596 • Toll Free Fax: 1-866-277-3677
Box 669 • Iqaluit, NU X0A 0H0 • Telephone: (867) 979-8500 • Toll Free: 1-877-404-4407 • Fax: (867) 979-8501 • Toll Free Fax: 1-866-979-8501
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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

26 Please clean and maintain the batteries.

MHSA art 10.(1) *The manager shall... ... employees and other persons at a mine.*

Noticed in-line plugs/receptacles have been installed in two of the 480V cords for Mary River refrigeration units. These plugs are a hazard as they can be pulled under load.

27 Please remove the in-line plugs.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed there is iron ore dust in the crushing plant's E-House 8. The electrical equipment is not designed for this type of environment and hence it requires frequent inspection and cleaning of the internal components.

28 Further to last year's electrical inspection report 20 May 2015 item 18, please advise the frequency the internal components of the switch gear and the transformers were checked for an accumulation of iron ore dust and the frequency it required cleaning.

MHSR sect 13.04. *The manager shall ensure that*
(a) the requirements of sections 10.04 and 10.13 to 10.15 are met in respect of all electrical systems and electrical equipment

MHSR sect 10.04.(3) *The procedure referred to in subsection (1) shall be based on the manufacturer's recommendations and shall*
(d) ensure that a written record of each test, inspection and maintenance work carried out on each unit of equipment or system is entered into a maintenance record specific to each unit of equipment or system and as required in the equipment's or system's log-book; and

Date of Report 20160720 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed there is an unprotected portable power cable running on the ground from e-House 8 to a Sea Can. This unprotected cable is routed through an equipment lay down area and is exposed to vehicle or equipment damage.

29 Please replace the portable cable with Teck cable and re-route it to protect it from physical damage.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed filler plates are required in 1) the lighting panel at the A-side Crusher MCC, and 2) the 20kW generator distribution panel at the Mine 110 laydown area

30 Please install filler plates in 1) and 2) to close opening left by the removed breakers.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed a cable is pulled out of the connector at a 6x6 JB on the tail end of crusher B screen feed conveyor.

31 Please re-secure the cable and ensure adequate strain relief is provided to prevent a recurrence.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed most of the cover screws are missing from the electrical distribution panels at Mary River's Truck Wash Building.

32 Please install all fasteners as per original equipment design.

MHSR sect 13.01.(1) *The electrical system and electrical equipment at a mine shall be*
(a) designed in accordance with good engineering practice; and
(b) constructed in accordance with a design and plans that have been certified by a professional

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engineer.

Noticed a sump pump at the South side of the truck wash platform, is fed by an extension cord from a receptacle on the perimeter of the building.

33 Please provide a hardwired permanent receptacle for the sump pump and eliminate the extension cord or remove the sump pump.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed an extension cord run through a window at the Mine 110 laydown office, to feed an adjacent Sea Can.

34 Please provide a permanent feed to the Sea Can and eliminate the extension cord.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the meter box used as a pull box at the Mary River Site Services Office trailer, however, it has no covers.

35 Please provide suitable covers for the enclosure or replace it.

MHSR sect 13.01.(1) *The electrical system... ... professional engineer.*

Noticed there is no working space at the electrical distribution equipment located on both sides of Mary River's Site services Garage.

36 Please provide a minimum of one-meter clear working space for the electrical distribution equipment located on the sides of the building.

Date of Report 2016 07 20 **Inspector** ____________

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the 600V switches at splitter 7451-SPL-002, have no labels.

37 Please identify the purpose of these switches and label them with proper printed labels.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed temporary handwritten labels used to identify electrical equipment in some areas of the mine.

38 As noted in inspection report 20 December 2014, please ensure permanent identification labels are installed on electrical equipment throughout the Milne Inlet and Mary River sites.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed the 208V disconnect switches at the Pit Office Distribution Sea Can, are labeled incorrectly.

39 Please install durable printed labels with the correct information.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Noticed at the bit sharpening shop extension cords are used to distribute power throughout the building.

40 Please install permanent wiring in the bit sharpening shop and remove the flexible cords...

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Date of Report 20160720 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed there is a receptacle outside the Pit Office, it is fed from a mini-distribution center via G-GC cable. The G-GC cable has been damaged and a splice has been made with electrical tape.

41 Please remake the splice with a shrink-on sleeve to provide the same protection, strength etc. as the original cable jacket or replace the G-GC cable. Provide GFI protection and ensure the receptacle is rated for this application.

MHSR sect 13.01.(2) *Except... ...CAN/CSA -M421 -93, Use of Electricity in Mines*

Date of Report 20160720 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Baffinland Iron Mines – Mary River and Milne Inlet Electrical Inspection

By: Jeff Fuller – J.A. FULLER ENGINEERING LTD Insp. Date: July 13 - 14, 2016

1) Milne Power House B did not have a single line diagram posted. Please post an up-to-date single line at this Power House.
2) Lock out stations should include adapters for locking molded case breakers where applicable.
3) Milne Mobile Equipment Maintenance Shop had clutter on the access platform for the distribution panels. Maintain one-meter clear working space free of clutter around this type of equipment.
4) Noticed that fire alarm panels at the Milne Mobile Equipment Maintenance Shop and Welding Shop were not active. Determine whether fire detection is necessary in these areas and either remove or activate the installed fire alarm panels.
5) Noticed a personal protection lock left on Panel 2521.2-2A-500 at the Milne Welding shop. Personal protection locks should only be used for personal protection when the worker is present and should be removed at end of shift. Follow the locking and tagging procedure for long term lock-out.
6) Cables between the Milne Toromont Shop and Office need to be secured and protected.
7) Teck cable between the main 600V switch and the splitter at the Milne Toromont shop is bent well beyond acceptable minimum radius. Re-serve in accordance with the Canadian Electrical Code.
8) The furnace on the South wall of the Milne Toromont Shop is damaged. Damage to the electrical panel is preventing the panel door from being closed. Repair or replace as required to restore the enclosure rating and permit the door to be closed.
9) Generator PDG 017 at the ship loader office has no ground. Install grounding in accordance with CSA M421-11 Clause 4.4.5.2.2.
10) Heat tracing on the sewage line at the ship loader office is connected via extension cord from the far side of the trailer. Hardwire the heat trace cable with Teck cable.
11) The out of service feeder cable for the wash car fed from the Milne BIM Project Office Sea can must be removed or insulated and identified.
12) A personal protection lock has been used for long term tagging of the above mentioned out of service wash car feeder switch. Follow locking and tagging procedure for long term locking and tagging.
13) Disconnect switches at the Milne Sewage Truck Storage Building are not accessible from the floor. Make the distribution readily accessible with one meter clear working space.

Date of Report 20160720 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

14) A personal protection lock has been used for long term locking and tagging at panel 2513-PNL-002A in the Milne Mine Rescue Team Building. Follow the locking and tagging procedure for long term locking and tagging.
15) A portable heater was temporarily stored on the access platform for the Milne Mine Rescue Team Building distribution. Other clutter was present on the platform as well. One meter clear working space must be maintained at all times. A portable compressor was located on the access platform and fed by an extension cord. Relocate the compressor so as not to interfere with electrical equipment access and to eliminate the extension cord.
16) At the Milne Water Treatment Plant the floor has subsided to the point that the main electrical control panel is on a noticeable slant. This panel is secured to a relatively narrow wooden platform. Ensure that anchoring for this platform is adequate given the increasing lean.
17) At the Milne Water Treatment Plant the sensor on top of the diesel tank for the fire pump has been bent almost to the point of breaking by a water line that has sagged as a result of the subsiding floor. Secure the water line and repair the sensor.
18) At the Milne Batch Plant computer power bars have been used for shop extension cords. These devices are not designed for high current loads. Remove the power bars and replace with permanent means of plugging in equipment as required.
19) At the Milne Batch Plant the mechanical interlock on the welding receptacle disconnect switch 2521..1 WPD 504 is broken. Replace the mechanism and restore to proper operation.
20) At the Milne Batch Plant sheet steel has been placed in front of a lighting panel such as to make it inaccessible. Maintain one meter clear working space.
21) Noticed that the portable generators used on the ore pad have main 600V termination lugs accessible without the use of tools. The latches on these access doors have provision for locking. Lock electrical enclosures that access live terminals without the use of tools.
22) Post the highest voltage (600V) on the above mentioned access doors.
23) Noticed that e-stops on the ship loader and on the reclaim conveyor do not operate when the pull cord is pulled toward the switch. Inadequate tension seems to be the problem. Re-tension these pull cords and include testing of e-stops in regular maintenance.
24) The flags on the above mentioned e-stops are seized and do not operate when the e-stop trips. These are monitoring devices and do not interfere with operation of the switch. Free up and test operation of the flags at the same time as the pull cord tests.

Date of Report 20160720 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

25) The protection relay on breaker H-411 (Crusher 8B Feeder) at the Mary River Power House 2 does not have a test sticker. Ensure that the relay was tested, apply a sticker indicating when the relay was tested, and provide evidence of the testing.
26) Insulating gloves are stored in cardboard boxes at Mary River Power House 2. Relocate the insulating gloves to another suitable storage location or provide metal storage cabinets. Eliminate combustible materials from switch rooms to the greatest extent possible.
27) Mary River E-Houses general note – a few items were noticed that are not directly associated with operation and maintenance of the E-Houses. These items should be removed.
28) Lockout stations are provided at some Mary River E-houses. Some have lockout stations that have not yet been installed. Apply a uniform policy. Include adapters for locking molded case breaker toggles where applicable.
29) Mary River E-House 1 Twin Pack batteries are badly corroded. Clean and maintain the batteries.
30) In-line plugs/receptacles have been installed in two of the 480V cords for Mary River refrigeration units. These plugs can be pulled under load. Remove the in-line plugs.
31) Mary River E-House 8 at the Crushers is very dusty. Show evidence of inspection of the transformers and switchgear to determine cleaning requirements and a schedule for periodic cleaning. After the electrical inspection in May of 2015 it was requested that a periodic inspection and cleaning be initiated. The equipment is not designed for this type of environment and hence requires periodic inspection and cleaning of internal components.
32) A portable power cable running from e-House 8 to a Sea Can is not protected and is in a lay down area for equipment where it will be damaged by vehicles or equipment. Replace with Teck cable and re-route to protect the cable from physical damage.
33) At the A-side Crusher MCC the lighting panel requires filler plates to close opening left by breakers being removed.
34) A cable is pulled out of the connector at a 6x6 JB on the tail end of the B spread screen feed conveyor. Re-secure the cable and ensure adequate strain relief to prevent a recurrence.
35) At the Mary River Truck Wash Building most of the cover screws are missing from the electrical distribution panels. Install all fasteners as per original equipment design.
36) At the South side of the truck wash platform a sump pump is fed by an extension cord from a receptacle on the perimeter of the building. If this sump pump is required then provide a hardwired permanent receptacle for it and eliminate the extension cord.

Date of Report 2016 07 20 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

37) At the Mine 110 laydown area the 20kW generator is not grounded. Provide grounding in accordance with CSA M421-11 Clause 4.4.5.2.2.
38) Provide filler plates for the distribution panel in the above mentioned generator.
39) At the Mine 110 laydown office an extension cord is run through a window to feed an adjacent Sea Can. Provide a permanent feed as required and eliminate the extension cord.
40) Provide a means of securing cables at movable generators to remove strain from connectors/terminations.
41) The generator at the 110 Communications Sea Can does not appear to be grounded. Provide grounding for the generator.
42) At the Mary River Site Services Office trailer the meter box is used as a pull box but has no covers. Provide suitable covers for the enclosure or replace it.
43) At the Mary River Site services Garage one meter clear working space is required for electrical distribution equipment on both sides of the building.
44) 600V switches at splitter 7451-SPL-002 have no labels. Identify the purpose of these switches with proper printed labels.
45) Implement a program to replace handwritten temporary labels with durable printed labels suitable for the environment.
46) At the Pit Office Distribution Sea Can 208V disconnect switches are labeled incorrectly. Install durable printed labels with the correct information.
47) At the bit sharpening shop extension cords have been used to distribute power throughout the building. Replace flexible cord with suitable permanent wiring methods.
48) Outside the Pit Office a receptacle is fed from a mini-distribution center via G-GC cable. The G-GC cable has been damaged and a splice has been made with electrical tape. Remake the splice with a shrink-on sleeve which affords the same protection, strength etc. as the original cable jacket or replace the G-GC. Provide GFI protection. Ensure that the receptacle is properly rated for the application.

The following individuals participated in electrical inspections:
Milne Inlet – Neil Robinson (electrical)
Mary River – Steve Gogo (electrical)

Date of Report 20160720 **Inspector** [signature]

20160721 – ELECTRICAL INSPECTION

August 8, 2016

Martin van Rooy
WSCC Mines Inspector
Iqaluit, Nunavut

Dear Mr. van Rooy:

Further to 20160721 Mary River project electrical and geotechnical inspection reports, please see our response to your inspection.

Best Regards,
Bikash Paul
General Manager

ELECTRICAL INSPECTION:

Noticed no single line electrical diagram was posted on the wall of Milne Power House B.

1 Please post an up-to-date single line at this Power House.

Response: Expected completion September 30, 2016

Some electrical equipment at Milne Inlet and at Mary River, are equipped with molded case breakers however, the adaptor for locking out the breaker, is not present in the electrical room.

2 Please ensure where molded case breakers are used, the lock out station has the adapters for locking out the molded case breakers.

Response: Adaptors for locking molded case breakers are received Expected completion date October 30, 2016

Noticed clutter or storage in front of electrical distribution panels at Milne's 1) Mobile Equipment Maintenance Shop, 2) Mine Rescue Team Building, and 3) Batch Plant.,

3 This is a repeat infraction see inspection report 21 March 2015... Please instruct all supervisors to check all electrical distribution panels in their area routinely, to ensure at least one meter clear working space, free of clutter is maintain around the electrical equipment.

`

The equipment stored in front of the electrical panel at the MRT garage has been removed. Completed July 27, 2016

Above pic is the MRT – complete.

Noticed the fire alarm panel at the Milne Mobile Equipment Maintenance Shop and at the Welding Shop are not active.

4 Please determine if fire detection in these areas is necessary and either remove or activate the installed fire alarm panels.

Item to be completed November 31st 2016

Noticed a personal protection lock left on 1) Panel 2521.2-2A-500 at the Milne Welding shop, 2) on the out of service feeder cable for the wash car fed from the Milne BIM Project Office, and 3) for the long term locking and tagging at panel 2513-PNL-002A in the Milne Mine Rescue Team Building. Personal protection locks should only be used for personal protection when the worker is present and should be removed at end of shift.

5 Please review the Baffinland lockout and tagging procedure and ensure the long-term or out-of-service equipment lockout is addressed and complied with.

RESPONSE:

BEFORE

AFTER

BEFORE

AFTER

All items to be completed by September 21st 2016.

Noticed the cables between the Milne Toromont Shop and Office are not secured and protected.

6 Please secure and protect the electrical cables between the Toromont shop and office.

RESPONSE:

Picture shows completion of action item.

Noticed the Teck cable between the main 600V switch and the splitter at the Milne Toromont shop is bent well beyond acceptable minimum radius.

7 Please re-serve the Teck cable in accordance with the Canadian Electrical Code.

RESPONSE:

Picture above shows completion.

Noticed the electrical panel of the furnace on the South wall of the Milne Toromont Shop, is damaged preventing the panel door from closing.

8 Please repair the enclosure to restore its rating and permit the door to be closed or replace the enclosure.

`

Item completed – pictures forthcoming.

Noticed some movable generators are installed without a ground 1) PDG 017 at the ship loader office, 2) the 20kW unit at the Mine 110 laydown area, and 3) the unit at the Mine 110 Communications Sea Can

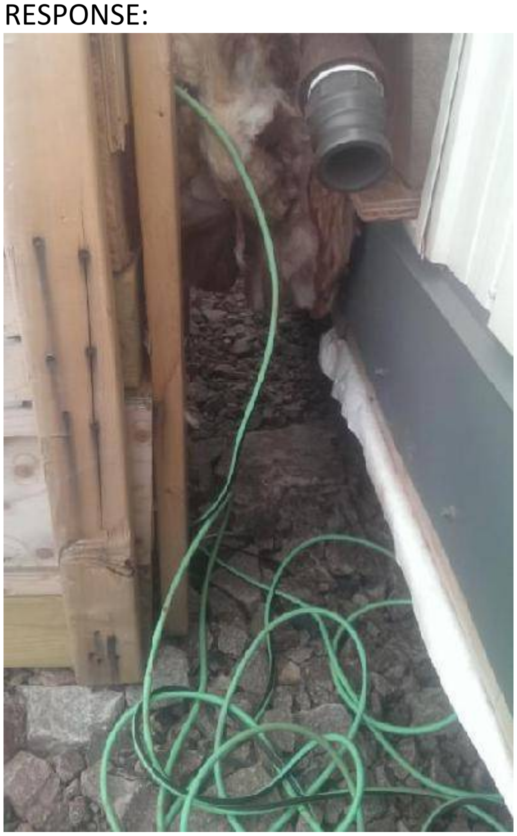
9 Please Install grounding in accordance with CSA M421-11 Clause 4.4.5.2.2.

Item completed

Noticed some of the electrical cables at the movable generators, are placing a strain on their connectors/terminations.

10 Please provide a means of securing the cables at movable generators, to remove the strain from connectors/terminations.

RESPONSE:



BEFORE

AFTER

Noticed an extension cord is used to supply power to the heat tracing on the sewage line at the ship loader office.

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11 Please hardwire the heat trace cable with Teck cable.

Item completed

Noticed there is an out-of-service feeder cable for the wash car fed from the Milne BIM Project Office Sea can.

12 Please remove the out-of-service feeder cable for the wash car fed from the Milne BIM Project Office Sea can or identify and insulate the end(s).

RESPONSE: Item 12 to be completed by October 31st 2016

Noticed the disconnect switches at Milne's Sewage Truck Storage Building, are not accessible from the floor.

13 Please make the distribution panel readily accessible with at least one-meter clear working space.

Response: Item to be completed by November 31st 2016

Noticed a portable heater and portable compressor fed by an extension cord, located on the access platform for the Milne Mine Rescue Team Building distribution.

14 Please remove the portable heater and portable compressor from the access platform so as not to interfere with electrical equipment access.

RESPONSE: Item completed – September 2016.

Noticed the main electrical control panel at the Milne Water Treatment Plant, is on a noticeable slant because the wooden floor it is attached to, has subsided.

15 Please re-block the platform and ensure that anchoring for this platform is adequate given the increased lean of this panel.

Completed –

Noticed the sensor on top of the fire pump's diesel tank at the Milne Water Treatment Plant, is bent by a sagged water line because of the subsiding floor.

16 Please secure the water line and repair the sensor.


STEE
Clemm

Completed – pic above is rotated 90degrees.

Noticed computer power bars used for shop extension cords at the Milne Batch Plant. As noted in previous inspection reports, these devices are not designed for high current loads.

17 Please install electrical outlets for plugging in the equipment and remove the power bars.

To be completed November 31st 2016

Noticed the mechanical interlock on the welding receptacle disconnect switch 2521.1 WPD 504 at the Milne Batch Plant, is broken.

18 Please replace the mechanism and restore to proper operation.

Item completed

Noticed the access door of the main 600V termination lugs on the portable generators used on the ore pad, is not locked, providing easy access to the live terminals.

19 Please lock or bolt the electrical enclosures to prevent access to the live terminals without the use of tool and post on the access doors, the highest voltage present in the cabinet.

Item completed

Noticed the e-stops on the ship loader and on the reclaim conveyor do not operate when the pull cord is pulled toward the switch.

20 This is a repeat infraction see inspection report 12 October 2015, please ensure pull cords are checked routinely to ensure the e-stop activates for all directions of pull on the cord.

To be completed September 21st 2016

Noticed the flags on the above-mentioned e-stops are seized and do not operate when the e-stop trips.

21 Please free up the flags and ensure they operate at the same time as conducting the pull cord tests.

Response: Item 21 tentative completion October 31st; depending on delivery of components that may be required.

Noticed the protection relay on breaker H-411 (Crusher 8B Feeder) at the Mary River Power House 2 does not have a test sticker.

22 Please ensure that the relay was tested and apply a sticker to the relay indicating when the relay was tested. Provide evidence of the testing.

RESPONSE:

BEFORE AFTER

Noticed the insulating gloves stored in cardboard boxes at Mary River Power House 2.

23 Please relocate the insulating gloves to another suitable storage location or provide metal storage cabinets for storage of the gloves and ensure combustible materials are eliminated from switch rooms to the greatest extent possible.

RESPONSE:
Insulating gloves and material stored in switch room.

Noticed a few items, not directly associated with the operation and maintenance of the E-Houses at Mary River, stored in the E-Houses

24 Please remove these items.

RESPONSE:
Items were removed.

Noticed a lockout station is provided in some Mary River E-houses, others have lockout stations that have not yet been installed.

25 Please install a lockout station in each E-house at Mary River and Milne and include adapters for locking molded case breaker toggles where applicable

RESPONSE:



Noticed the Twin Pack batteries in Mary River's E-House 1, are badly corroded.

26 Please clean and maintain the batteries.

Item to be completed September 21st 2016.

Noticed in-line plugs/receptacles have been installed in two of the 480V cords for Mary River refrigeration units. These plugs are a hazard as they can be pulled under load.

27 Please remove the in-line plugs.
Item may require investigation – completion target October 31st.

Noticed there is iron ore dust in the crushing plant's E-House 8. The electrical equipment is not designed for this type of environment and hence it requires frequent inspection and cleaning of the internal components.

28 Further to last year's electrical inspection report 20 May 2015 item 18, please advise the frequency the internal components of the switch gear and the transformers were checked for an accumulation of iron ore dust and the frequency it required cleaning.

RESPONSE:
The iron ore dust in e-house 8 has been cleaned up. Regular cleaning will continue.

Noticed there is an unprotected portable power cable running on the ground from e-House 8 to a Sea Can. This unprotected cable is routed through an equipment lay down area and is exposed to vehicle or equipment damage.

29 Please replace the portable cable with Teck cable and re-route it to protect it from physical damage.

RESPONSE:
Portable power cable feeding sea can was replaced with armored cable and rerouted.


Noticed filler plates are required in 1) the lighting panel at the A-side Crusher MCC, and 2) the 20kW generator distribution panel at the Mine 110 laydown area

30 Please install filler plates in 1) and 2) to close opening left by the removed breakers.

RESPONSE:
Filler plates installed.

Noticed a cable is pulled out of the connector at a 6x6 JB on the tail end of crusher B screen feed conveyor.

31 Please re-secure the cable and ensure adequate strain relief is provided to prevent a recurrence.

Completion October 31st 2016.

Noticed most of the cover screws are missing from the electrical distribution panels at Mary River's Truck Wash Building.

32 Please install all fasteners as per original equipment design.

RESPONSE:
Fasteners installed.

Noticed a sump pump at the South side of the truck wash platform, is fed by an extension cord from a receptacle on the perimeter of the building.

33 Please provide a hardwired permanent receptacle for the sump pump and eliminate the extension cord or remove the sump pump.

RESPONSE:
Truck wash sump pump hard wires receptacle.

Noticed an extension cord run through a window at the Mine 110 laydown office, to feed an adjacent Sea Can.

34 Please provide a permanent feed to the Sea Can and eliminate the extension cord.

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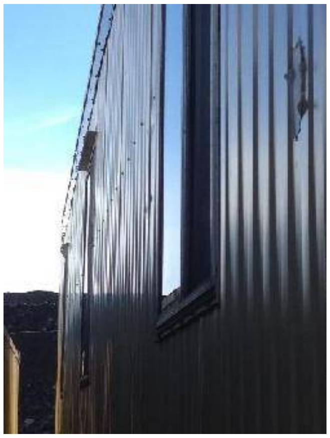
RESPONSE:

Noticed the meter box used as a pull box at the Mary River Site Services Office trailer, however, it has no covers.

35 Please provide suitable covers for the enclosure or replace it.

RESPONSE:
Cover placed on meter box.

Noticed there is no working space at the electrical distribution equipment located on both sides of Mary River's Site services Garage.

36 Please provide a minimum of one-meter clear working space for the electrical distribution equipment located on the sides of the building.

Completed August 15, 2016

Noticed the 600V switches at splitter 7451-SPL-002, have no labels.

37 Please identify the purpose of these switches and label them with proper printed labels.

RESPONSE:
Labels posted.

Noticed temporary handwritten labels used to identify electrical equipment in some areas of the mine.

38 As noted in inspection report 20 December 2014, please ensure permanent identification labels are installed on electrical equipment throughout the Milne Inlet and Mary River sites.

Item to be completed October 31st 2016.

Noticed the 208V disconnect switches at the Pit Office Distribution Sea Can, are labeled incorrectly.

39 Please install durable printed labels with the correct information.

RESPONSE:
Pit office disconnect labeled properly.

Noticed at the bit sharpening shop extension cords are used to distribute power throughout the building.

40 Please install permanent wiring in the bit sharpening shop and remove the flexible cords...

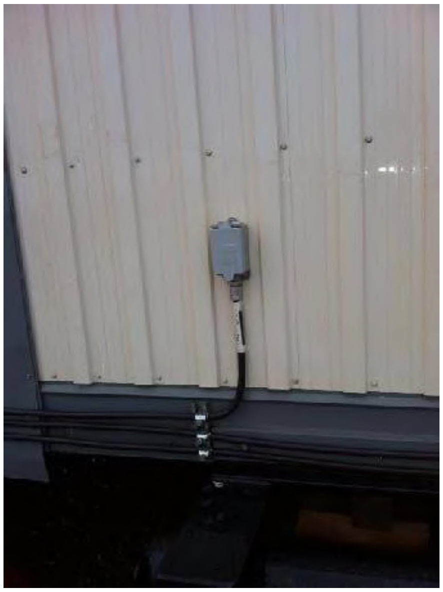
RESPONSE:



Noticed there is a receptacle outside the Pit Office, it is fed from a mini-distribution center via G-GC cable. The G-GC cable has been damaged and a splice has been made with electrical tape.

41 Please remake the splice with a shrink-on sleeve to provide the same protection, strength etc. as the original cable jacket or replace the G-GC cable. Provide GFI protection and ensure the receptacle is rated for this application.

RESPONSE:



WSCC Workers' Safety & Compensation Commission | ᐃᓄᐃᑦ ᐊᓯᔾᔨᕆᔪᓐᓇᖅᑎᖏᑦ

20160721

email Sylvain.Proulx@baffinland.com

Sylvain Proulx
Chief Operating Officer
Baffinland Iron Mines Corporation
2275 Upper Middle Road East - Suite 300
Oakville ON L6H 0C3

Dear Mr. Proulx:

Further to the **Mine Health and Safety Act article 26** attached is the 20160721 Mary River project geotechnical inspection report.

As per **MHSA article**

28. Please post a copy of this inspection report in a conspicuous location, and

29. Advise the chief inspector within 30 days of the remedial measures taken and the remedial measures still to be taken in respect of the inspection report.

32.(1) A person who is adversely affected by a decision or order issued by an inspector may appeal the decision or order, in writing, to the chief inspector within 30 days after its issue.

The WSCC is committed to service excellence. If you have any questions or concerns about this inspection report, please feel free to contact my supervisor Fred Bailey or myself. His phone number is 867 669 4430 or email fred.bailey@wscc.nt.ca.

Sincerely
Workers' Safety and Compensation Commission of the NWT and NU Mine Safety

Martin van Rooy
Engineer/Mines Inspector

cc OHSC c/o tony.noseworthy@baffinland.com hal.finely@baffinland.com

WSCC Workers' Safety & Compensation Commission | ᐃᖅᑲᓇᐃᔮᖅᑎᓄᑦ ᐊᑦᑕᓇᖅᑐᓂᒃ ᐊᒻᒪ ᓇᕐᓂᐅᑉᑯᒪᓂᒃ ᖃᐅᔨᓴᖅᑎᑦ

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Mine:	Mary River project	Location:	~950 km NW of Iqaluit		
Operator:	Baffinland Iron Mines Corp.	Lat.	71-19'N	Long.	79-24'W
Manager:	Sylvain Proulx	Inspection Date:		2016012 to 15	
Address	2275 Upper Middle Road East - Suite 300 Oakville ON L6H 0C3				

A geotechnical inspection was conducted by Mr. Michael Cullen, WSCC's geotechnical, of Baffinland's Milne Inlet and Mary River sites. Mr. Martin van Rooy, WSCC's engineer/mine inspector, was to accompany Mr. Cullen for this inspection however; bad weather in Iqaluit prevented his flight. The site review included the pit, waste rock dump, Mary River quarries, ore load out dock, ore stockpiles, and Milne quarry. Mr. Cullen's report '*Geotechnical Review of Mary River Project: July 13, 14, 15 2016*' is attached for information.

Darryl Finlay at Milne Inlet and Jeremy Moar at Mary River accompanied Mr. Cullen for this inspection.

Noticed the mine has restricted access to the danger zone at the crest and toe of pit walls however, the Standard Operating Procedure (SOP) and Job Hazard Analysis (JHA) reviewed contained only limited documentation of this restriction.

1 Please develop an appropriate SOP for all persons and equipment working in the pit and where work is required below a face, it must have prior approval from the geotechnical specialist on site.

MHSA article 10. (1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed the SOP and JHA for Milne Inlet's ore stockpile sample and survey work did not clearly articulated Golder's recommendations and warnings concerning working on and excavating stockpile slopes.

2 Please reviewed the SOP and JHA and ensure the recommendations made by Golder, are clearly articulated in the documents.

Date of Report 20160721 **Inspector** [signature]

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Promote workplace safety and care for injured workers

REPORT OF AN INSPECTOR OF MINES

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MHSA article 10. (1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

An angle of repose stockpile is only marginally stable, as soon as the toe of the stockpile is excavated the stockpile angle increases and it becomes potentially unstable. As such, no foot traffic should be allowed on a stockpile face once extraction has commenced (even if extraction is no longer occurring). Buried ice and snow also create potentially unstable conditions and no foot traffic should be allowed on stockpiles faces with buried snow or ice that have potentially melted.

3 Please develop an SOP for stockpile extraction for when the excavated face become oversteep due to presence of ice or consolidated material and an SOP for surveying the stockpile that includes no foot access on potentially unstable surfaces.

MHSA article 10. (1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed the following deficiencies noted for the Milne Inlet Quarry:- 1) significant loose on the bench faces, 2) bench width is less than 8m, 3) inadequate berms on the haul roads, and 4) a frozen blast at the south end.

4 Please install berms and post NO-ENTRY signage restricting access to the quarry and perform no work in it until a quarry design compliant with the requirements of the MHSR (e.g Section 1.03 and 1.04) and accepted engineering practice has been approved by WSCC.

MHSR sect 1.03.(1) *The owner of a surface mine or an underground mine shall maintain a mine design, acceptable to the chief inspector, assessing the ground stability of the active and proposed workings of the mine.*

(2) *The mine design that the owner is required to maintain shall be prepared by or under the direction of a professional engineer experienced in ground stability design and shall bear the engineer's seal and signature.*

Date of Report 20160721 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the following deficiencies noted for the QMR2 Quarry: - 1) loose across the bench faces, and 2) bench width is less than 8m.

5 Please install berms and post NO-ENTRY signage restricting access to the quarry and perform no work in it until a quarry design compliant with the requirements of the MHSR (e.g. Section 1.03 and 1.04) and accepted engineering practice has been approved by WSCC.

MHSR sect 1.03.(1) *The owner of a surface mine or an underground mine shall maintain a mine design, acceptable to the chief inspector, assessing the ground stability of the active and proposed workings of the mine.*

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Date of Report 20160721 **Inspector** [signature]

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Phone (250) 339-2633
michaelcullen@shaw.ca

July 18, 2016

Workers' Safety and Compensation Commission
PO Box 8888
Yellowknife, NT
X1A 2R3

Attn: Fred Bailey P.Eng., Chief Inspector of Mines

Subject: Geotechnical Review of Mary River Project: July 13, 14, 15 2016

Introduction

As requested Michael Cullen Geotechnical Ltd (MCG) completed a geotechnical review of Baffinland Iron Ore Mines Corporation Mary River Project on July 13, 14, 15 2016. The purpose of this inspection was as follows:

1. To assess if the operation is meeting the intent of the Mine Health and Safety Regulation (MHSR) as it applies to geotechnical stability.
2. To review if the operation is following generally accepted engineering practices for geotechnical design, construction, and operation that may affect health and safety.
3. To provide general comment on geotechnical conditions at the mine that may affect health and safety.
4. To provide direction to the Mines Inspectors on geotechnical issues potentially affecting health and safety.

The site review tour included the pit, waste rock dump, Mary River quarries, ore load out dock, ore stock piles, and Milne quarry. The Milne Inlet site review was completed with Daryl Finlay of Baffinland. The Marry River site review was completed with Jeremy Moar, of Baffinland. A close out meeting with Mine Management and OHS personal was held following the inspection.

As part of this review we received and have reviewed the following documents:

- "Guidelines for Working Near Crushed Ore Stockpiles" by Golder Associates dated May 3, 2016.
- "Geotechnical Review of the Updated 5 Year Pit Deposit 1 Open Pit Mary River, Baffinland" by Golder Associates, dated April 17, 2016.
- "Ground Control Management Plan R0" by Baffinland Iron Mines Corporation, December 2015.
- "Baffinland Mary River Open Pit Geotechnical Inspection August 2015" by Golder Associates, dated September 21, 2015.
- Various Standard Operating Procedures and Job Hazard Analysis prepared by Baffinland Iron Mines Corporation.
- "Bench Scale Rockfall Report Letter" by Baffinland Iron Mines, dated June 24, 2016.

Open Pits

The 5-year starter pit is underway with 3 benches: 640, 650 and 660.

Due to uncertainty with geologic structure a somewhat conservative design approach has been adopted for the starter pit: it is less than 100m deep, with an overall slope of 45 degrees, final walls will use 20m high bench faces with a 70 degree face angle, and 13m design width. All final walls will be trim blasted. The configuration of the starter pit is such that there will be opportunity to adjust the configuration as experience and additional knowledge is gained. The experience and knowledge gained in the starter pit will be used to design the final pit.

The design for the starter pit did not include a detailed assessment of bench crest break-back, assessment of the ability of bench to contain the largest expected bench scale failure, or assessment of rockfall capture. The rational for omitting was lack of credible information. We consider that it was acceptable to omit these assessments due to the relatively small pit size, 5 year pit life, conservative design approach taken with adaptable configuration.

The mine is completing routine mapping of geologic structure to verify design assumptions and to project structures into future benches to allow time to modify layout if required. The Mine has engaged Golder Associates to assist with pit design and blast design.

Final pit wall bench faces are to be 20m high (up to 25m on first bench). The upper half of the final pit walls is now exposed on the 660 bench, see Photo 1 and 2. During spring thaw a 200t failure occurred from a section of the final wall. It is understood that this section of the wall appeared to be stable at the time of development. The failure was controlled by the dominate N-S striking structure, see Photo 1. Following the failure, the wall once again appears stable. We suspect that there will be ongoing stability issues with the first bench face once it is taken to final height (10m more than present). It should be noted that very few pits in the NWT and Nunavut attempt to create double benches in the first 30m below surface due the presence of the more fractured and weathered cap rock. The Mine reports that it is implementing the following measures to mitigate stability concerns and the rockfall hazard on the upper final wall:

- Re-scale all exposed walls while still reachable
- Place berms at toe of faces identified as potentially unstable.
- Restrict access to the danger zone at the crest and toe of a bench.
  - We reviewed several SOP and JHA and only found limited documentation of this restriction. We recommend that appropriate SOP be developed for all persons and equipment working in the pit.
- Require that work below faces be approved by technical services.
  - We reviewed several SOP and did not find this to be documented as a standard operating procedure. We recommend that appropriate SOP be developed.
- Regular inspections by shift boss and technical services.
- Maintain bench access to allow for future scaling and removal of rockfall material if required.
- Ability to reduce height of upper bench by cutting down top.

Internal pit benches are 10m high. The condition of the internal bench faces was observed to vary from good to poor. Faces that break back to the dominant N-S structure often look very good whereas geologic structure and blast damage may both contributed to the poor conditions.

It is understood that blast pattern changes are being made to reduce this damage, especially in the vicinity of final wall crests. Photo 3 shows a typical internal wall on 650 Bench.

Overburden consisting of very fractured rock and residual soil is present across the crest of many of the new benches opened across the hill. It is understood that when frozen the overburden material is fairly competent. Once thawed the material is cohesionless and tends to fail from the crest of the cuts, see Photo 4. The Mine reports that it manages this with the following procedures:

- Pull back unstable overburden material from the crest
- Place berms at toe of faces identified as potentially unstable.
- Restrict access to the danger zone at the crest and toe of a bench.
    - We reviewed several SOP and JHA and only found limited documentation of this restriction. We recommend that appropriate SOP be developed for all persons and equipment working in the pit.
- Require that work below faces be approved by technical services.
    - We reviewed several SOP and did not find this to be documented as a standard operating procedure. We recommend that appropriate SOP be developed.
- Regular inspections by shift boss and technical services.

Based on this review we consider that the starter pit is being designed, constructed and operated in general conformance with the requirements of the Mine Health and Safety Regulation as well as accepted engineering practices. No areas of unmanaged geotechnical concern affecting safety were identified although there is a need to formalize and document standard procedures.

Waste Rock Dump

The waste rock dump currently consists of two 3m lifts: one NAP one PAG, see Photo 5. The dump is being constructed by conventional end dumping. The dump is considered low hazard; it is being constructed on gentle sloping ground and its final height will be ~22m.

Section 1.147 of the MHSR requires that a monitoring and surveillance program be developed. For low hazard dumps the minimum acceptable program would include documented inspections by persons familiar with dump design and stability. It is understood that operations staff complete daily inspections of the dump during dumping operations, and that Technical Services complete weekly inspections.

Based on this review we consider that the waste rock dump is being designed, constructed and operated in general conformance with the requirements of the Mine Health and Safety Regulation as well as accepted engineering practices. No areas of geotechnical concern affecting safety were identified.

Milne Inlet Ore Stockpiles

The temporary ore stockpiles are constructed using either a stacker or loader. The stockpiles will be up to 18m high with angle of repose slopes see Photo 6. The stockpiles are extracted by loader excavation at the toe. It is understood that the stockpiles have performed well to date, with no indications of instability other than shallow movement at surface. It should be noted that this is the first year that full height stockpiles have been developed.

It is understood that the stockpiles need to be sampled and surveyed on a regular basis. Surveying is generally completed by foot traverses over the stockpiles. Golder Associates reviewed stockpile stability and provided appropriate direction and warnings concerning working on and excavating stockpile slopes. We reviewed several SOP and JHA and did not find that Golder's recommendations were articulated in these documents.

An angle of repose stockpile is only marginally stable, as soon as the toe of the stockpile is excavated the stockpile angle increases and it becomes potentially unstable. As such, no foot traffic should be allowed on a stockpile face once extraction has commenced (even if extraction is no longer occurring). Buried ice and snow also create potentially unstable conditions and no foot traffic should be allowed on stockpiles faces with buried snow or ice that have potentially melted. Alternate means of surveying should be used in these situations (e.g. drone, reflector-less EDM).

Based on this review we consider that the stockpiles are being designed, constructed and operated in general conformance with the requirements of the Mine Health and Safety Regulation and accepted engineering practices. An appropriate SOP and JHA has been developed for sampling around the stockpiles. A SOP should be developed for surveying that includes no foot access on potentially unstable stockpile surfaces. A SOP should be developed for stockpile extraction for when the excavation faces become oversteep due to presence of ice or consolidated material.

Milne Inlet Dock

It is understood that a recent deformation survey of the pile foundations showed that piles are performing as per the assumptions and analysis by PND and GeoEngineers. The piles are considered stable.

Sinkholes up to 0.5m deep were noted in the dock fill deck below and on the seaward side of the ship loaders. It is understood that sinkholes up to ~1m deep have occurred in the past. The cause, and significance of these sinkholes is being investigated by the Mine and its consultants. At this time equipment traffic is restricted from using this area and regular visual inspections are being completed.

Quarries

The Milne Inlet Quarry was not operational at the time of this inspection. It is understood that the quarry will be brought back into operation in the near future. The quarry is up to 40m high and consists of 4 bench faces, see Photo 7. The following deficiencies were noted:

- There is significant loose on the bench faces.
- Bench width is less than 8m, in some cases this appears to be by design rather than due to crest break back.
- There are inadequate berms present on the haul roads.
- A frozen blast is located on the south end.

The quarry should be designed and operated as per the requirements of the MHSR (e.g Section 1.03 and 1.04) and accepted engineering practice. We recommend that no further work be allowed until such time as a mine plan, consistent with the MHSR, is developed and submitted to WSCC. A berm should be placed to restrict access to the quarry.

The QMR2 Quarry was not operational at the time of this inspection. It is understood that the quarry will be brought back into operation in the near future. The quarry is up to 30m high and consists of 3 bench faces that are 8 to 10m high, see Photo 8. The following deficiencies were noted:

- There is loose across the bench faces.
- Bench width is less than 8m, it appears that this is due to crest break back.

The quarry should be designed and operated as per the requirements of the MHSR (e.g Section 1.03 and 1.04) and accepted engineering practice. We recommend that no further work be allowed until such time as a mine plan, consistent with the MHSR, is developed and submitted to WSCC. A berm should be placed to restrict access to the quarry.

The D1Q2 Quarry has just started operation adjacent to KM106 on the haul road. It is understood that the Technical Services group have developed plans for this quarry that are consistent with the requirements of the MHSR.

Compliance with the Mine Health and Safety Regulation

Table 1 lists the relevant ground control requirements of the Mine Health and Safety Regulation. The table provides comment on if the Mine is meeting the intent of the Regulation, and if not what is required. Sections in the Table left blank were not assessed during this review or are not applicable at this time.

Conclusions and Recommendations

Other than some operation concerns around stockpiles, highwalls, and quarries no significant unmanaged worker safety hazards related to geotechnical aspects of design and operation were noted during our site review. For the most part the intent of the Mine Health and Safety Regulation as it relates to ground stability and worker safety is being met at the Mine. The Mine is following the recommendations of their geotechnical engineers and consultants, whose designs are considered to be consistent with accepted engineering practices.

The documentation that we reviewed is considered to be consistent with accepted practices. To be consistent with best practices we recommend that the following be adopted by the Mine:

- In the future any rock fall reports should include a "lessons learned" section to help understand and mitigate the hazard of future events.
- The ground control management plan should include the pit design basis information in an appendix such that it is readily referenced by future designers and regulators.
- The ground control log book should include a system to track concerns and note when ground control issued have been remedied.

When available we request that the following documents be submitted to WSCC.

- 2016 Geotechnical Inspection Review report for the pit.
- Design for the QMR2 quarry consistent with the MHSR
- Design for the QMR1 quarry consistent with the MHSR
- Design for the Milne quarry consistent with the MHSR
- Assessment of the frozen blast at the south end of the Milne quarry
- Assessment of the sinkholes along the ore dock
- SOP for surveying the Milne ore stock piles.
- SOP for stockpile excavation.
- SOP for work being completed around the crest and toe of pit highwalls.

Limitations and Closure

Michael Cullen Geotechnical Ltd. prepared this report for the use of the WSCC. This report is based on a review of select reports and work areas at the Mine, and cannot practically cover the entire mine site. Professional reliance has been used throughout this review. This report provides comments and opinions only, based on limited observations and review of the work of others; it is not intended to be used in engineering design.

Michael Cullen Geotechnical Ltd. does not accept liability for any damages suffered where a third party uses this report, or where it is used for purposes other than intended.

We trust that this report satisfies your present requirements. Should you have any questions or comments, please do not hesitate to contact us.

Sincerely
Michael Cullen Geotechnical Ltd.
Per:

REGISTERED PROFESSIONAL ENGINEER
M CULLEN
LICENSEE
NWT/NU

Michael Cullen, P.Eng.
Cc Martin van Rooy

Photo 1: 200 t failure from 15m high final pit wall face on upper bench. Ultimate height will be ~25m

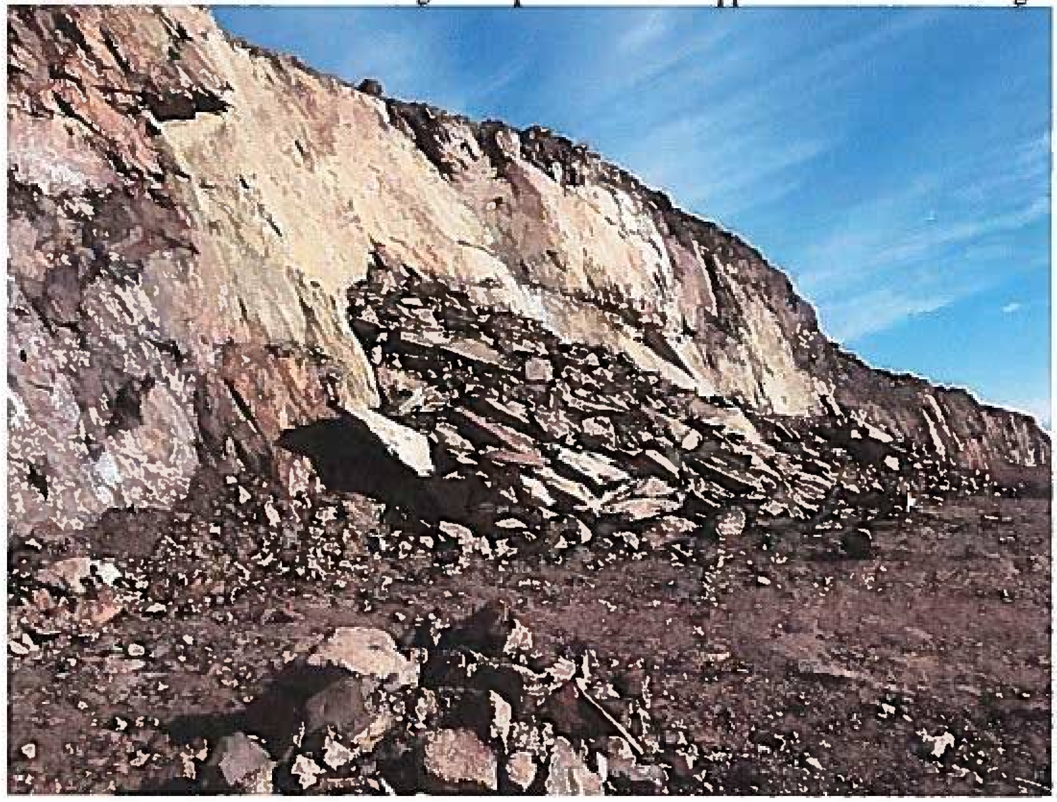

Photo 2: Ongoing raveling from 12m high final pit wall face on upper bench. Ultimate will be ~22m

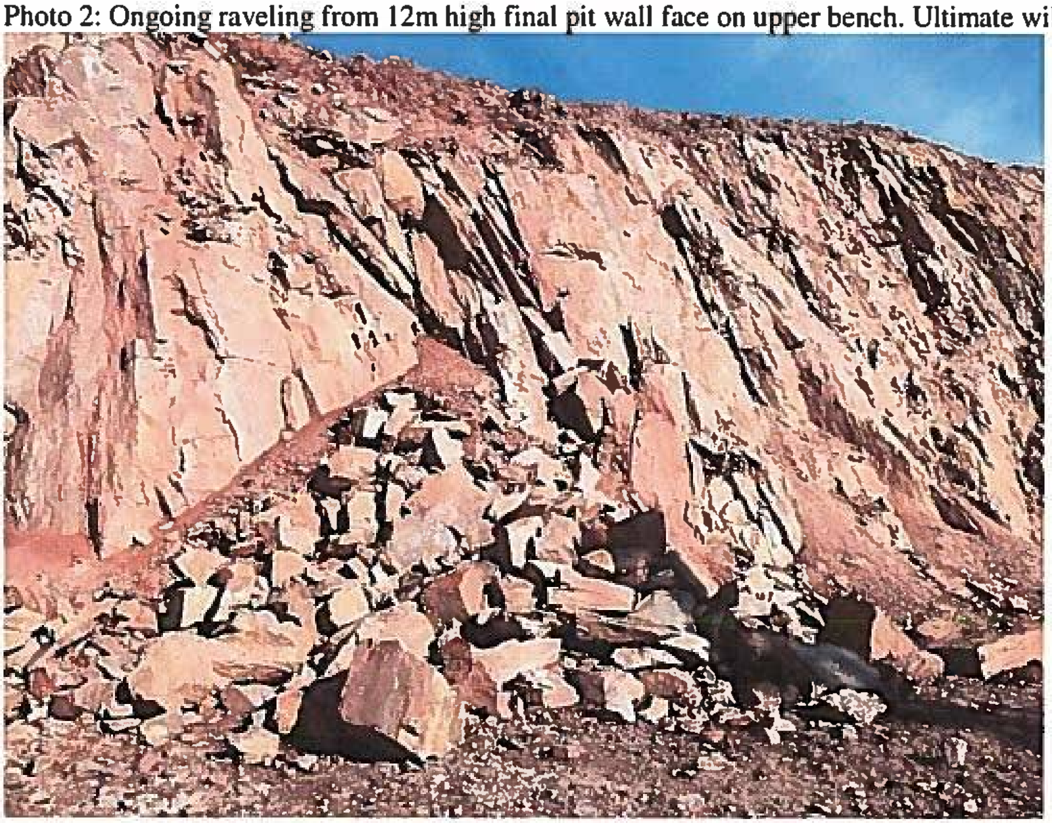

Photo 3: 10m high internal wall on 650 Bench. Geologic structure and blast damage contribute to local instability.

Photo 4: 10m high internal wall on outside edge of 640 Bench. Overburden across top of bench is raveling now that it has thawed.

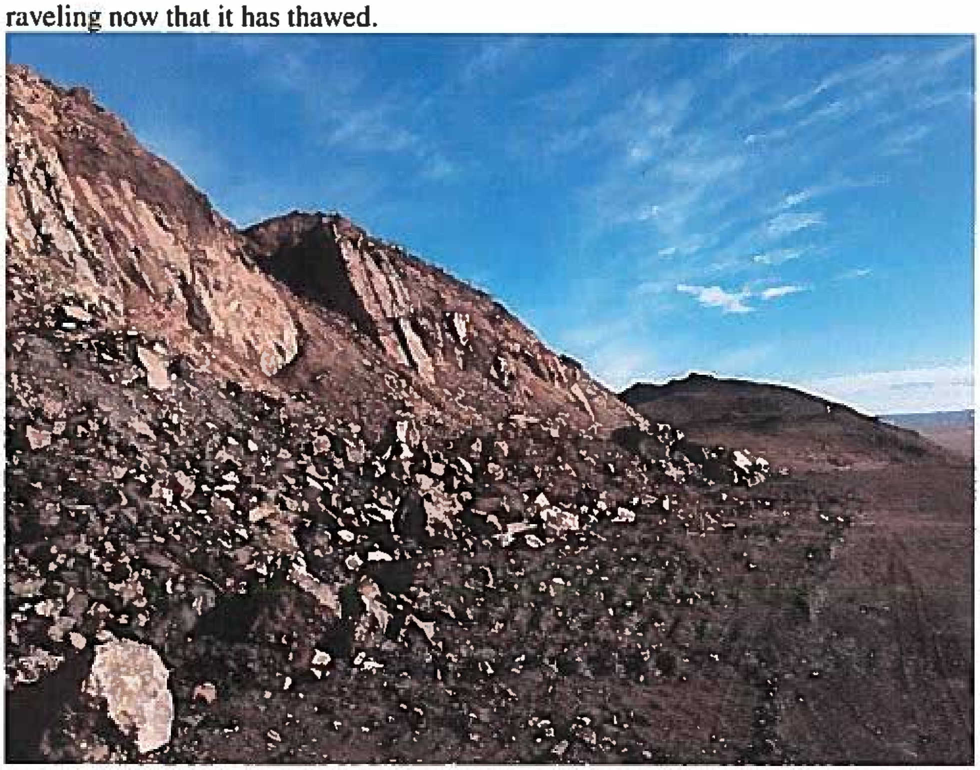

Photo 5: Waste Rock Dump with new sediment pond in background.

Photo 6: 18m high angle of repose stockpile with frost on surface

Photo 7: Milne Quarry. Much loose present of faces and bench width less than 8m

Photo 8: QMR2 Quarry. Much loose present of faces and bench width less than 8m

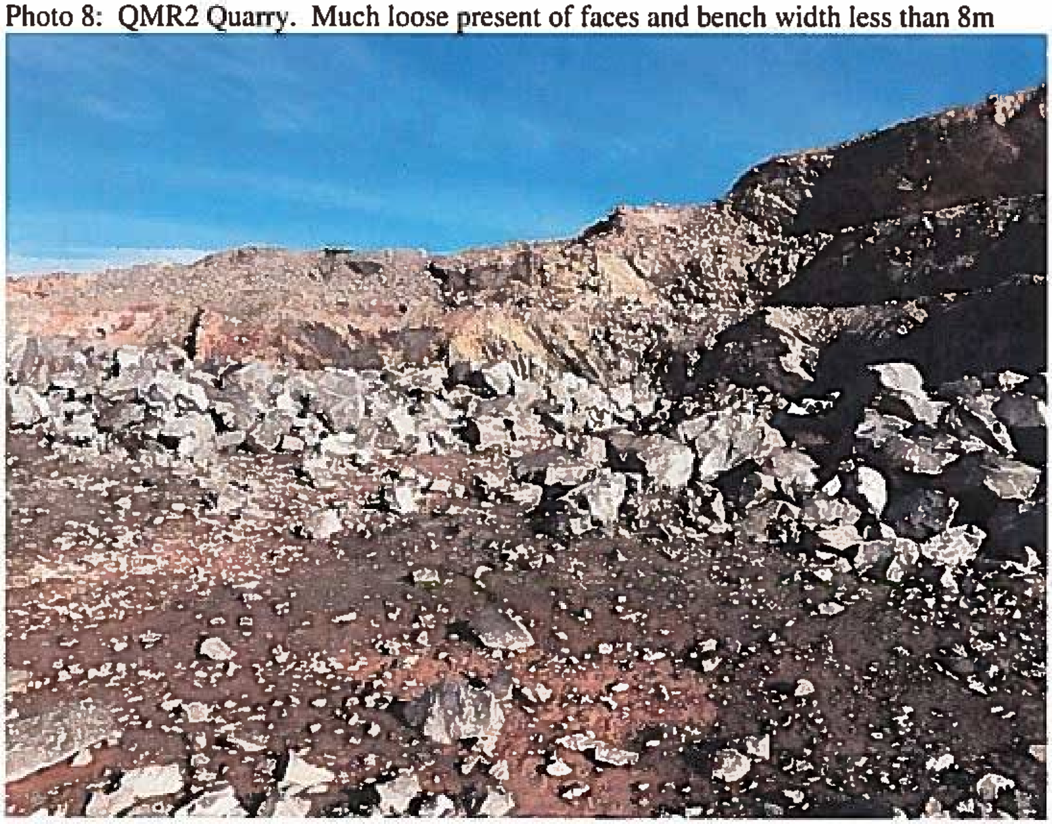

Table 1: Relevant Geotechnical Requirements of the Mine Health and Safety Regulation

Section of Regulation	Comments	Recommended Action
1.03.(1) The owner of a surface mine or an underground mine shall maintain a mine design, acceptable to the chief inspector, assessing the ground stability of the active and proposed workings of the mine. (2) The mine design that the owner is required to maintain shall be prepared by or under the direction of a professional engineer experienced in ground stability design and shall bear the engineer's seal and signature.	Milne Port and QMR2 quarry are not in compliance with regulation	Pit is in conformance with the regulation. No action is required at this time. Mine to submit appropriate design for Milne and QMr2 quarry prior to them being put back into operation.
1.04. The mine design shall consist of drawings, plans, calculations, specifications and written descriptions and shall (a) describe the geology of the mine; (b) outline the geometry of existing excavations, if any, and proposed excavations; (c) provide the rock mass characteristics that are representative of the ore, footwall and hanging wall rock that will be encountered most frequently and identify the orientation of the most common joint sets; (d) describe the hydrological features that may affect the working of the mine; (e) describe previous occurrences of ground instability and include recommendations from reports of investigations; (f) describe, for surface mines, expected climate conditions, the presence of permafrost, if any, and average monthly precipitation; (g) describe the mining method including bench or stope sequencing and blasting methods; (h) specify ground support systems, including pillars, backfill, timber support, tendon support and any other type of support, the criteria used concerning their selection, dimension, spacing and extent; (i) describe measures used and planned to assess potential ground instability; (j) include specific precautions to be taken concerning parts of the mine where bodies of water, overburden, tailings, gas, low oxygen or water soaked material may inrush or flood the workings; and (k) include such other information as the chief inspector may require.	Milne Port and QMR2 quarry are not in compliance with regulation.	Pit is in conformance with the regulation. No action is required at this time. Mine to submit appropriate design for Milne and QMR2 quarry prior to them being put back into operation.
1.05. The mine design shall be assessed and updated by an authorized person annually and before any major change is made to the mining method or the equipment used.		Mine is in conformance with the regulation. No action is required at this time.

Table 1: Relevant Geotechnical Requirements of the Mine Health and Safety Regulation

Section of Regulation	Comments	Recommended Action
1.24. A ground control logbook shall be maintained for surface and underground mines (a) the time, date and location of all tests relating to the requirements of the quality control program for ground support systems specified in section 1.13; (b) if there is any ground movement in the mine, details of the records of the ground monitoring devices in the area affected before the ground movement; (c) details of uncontrolled falls of ground; (d) details of working ground, tension cracks or other signs of instability; (e) details of rockburst and seismic events; (f) damaged supports; and (g) measurements taken from monitoring devices.	Mine has implemented a ground control logbook	Mine is in conformance with the regulation. No action is required at this time.
1.26. The shift boss shall convey the information contained in the ground control logbook referred to in the paragraphs 1.24(c) to (f) to every employee, worker and any other person working in the area under the shift boss' supervision before the employee, worker or other person begins working in the area.		Mine is in conformance with the regulation. No action is required at this time.
1.27. The ground control logbook shall be read and signed each day by the shift boss and by the mine engineer designated by the manager.		Mine is in conformance with the regulation. No action is required at this time.
1.135. All trees and other vegetation, clay, earth, sand, gravel, loose rock or other unconsolidated material lying within 2 m of the rim of a working face or wall in a surface mine shall be removed and beyond this distance all unconsolidated material shall be sloped to an angle less than the natural angle of repose.		Mine is in conformance with the regulation. No action is required at this time.
1.136. (1) No work shall be conducted at or below a face or wall of a surface mine until that face or wall has been examined and declared safe by the shift boss. (2) Nothing in subsection (1) shall prevent the shift boss from being accompanied by other persons who may be required to make the face or wall safe.		Mine is in conformance with the regulation.
1.137. (1) Where a surface mine is worked in benches, (a) each catchment berm shall be designed so that its final width will not be less than 8 m; and (b) loose rock shall not be allowed to accumulate on a bench or catchment berm in a manner that endangers any person working on a lower bench. (2) The manager shall, in consultation with the Committee, develop a procedure acceptable to the chief inspector that provides for the safety of workers should loose rock accumulate on a catchment berm and access to clean it not be possible.	Milne Port and QMR2 quarry are not in compliance with regulation	Pit is in conformance with the regulation. No action is required at this time. Mine to submit appropriate design for Milne and QMR2 quarry prior to them being put back into operation.

Table 1: Relevant Geotechnical Requirements of the Mine Health and Safety Regulation

Section of Regulation	Comments	Recommended Action
1.138. No person shall allow any part of a face or wall of a surface mine to overhang.		Mine is in conformance with the regulation. No action is required at this time.
1.139. At a surface mine where unconsolidated material is being worked or removed and could collapse onto the loading equipment, the vertical face shall not be higher than the reach of the loading equipment.		Mine is in conformance with the regulation. No action is required at this time.
1.140. Except where the working face is sloped at an angle acceptable to the chief inspector, the height of the working face shall not be more than 2 m higher than the reach of the loading equipment.		Mine is in conformance with the regulation. No action is required at this time.
1.141. Sections 1.139 and 1.140 do not apply (a) where material is removed by backhoe, excavator, dragline or similar equipment operating from above the face that it is excavating; or (b) where a multiple bench system of mining is being carried on in accordance with conditions approved by the chief inspector.		Mine is in conformance with the regulation. No action is required at this time.
1.147. The manager shall implement and maintain a surveillance and instrumentation program recommended in a waste dump design approved by the chief inspector.	WRD is inspected daily by shift boss and weekly by Technical Services	Mine is in conformance with the regulation. No action is required at this time.
1.150. A dump shall be designed by a professional engineer where required by the chief inspector or where it has one or more of the following characteristics: (a) a planned volume that exceeds one million cubic m; (b) a height of dump in excess of 50 m; (c) an area to be covered by the dump exceeding 5 ha; (d) it is founded upon natural or trimmed slopes which are sometimes steeper than 20 from a horizontal plane; (e) where waste material is dumped or placed in a water course having a potential peak flow greater than 1 cubic m per second, once in every 200 years, (f) it is situated in such a way that it may be a potential menace to a building, a road, a domicile, a prominent power transmission line, a pipeline or a major water course.	The WRD is considered low hazard.	Mine is in conformance with the regulation. No action is required at this time.

Table 1: Relevant Geotechnical Requirements of the Mine Health and Safety Regulation

Section of Regulation	Comments	Recommended Action
1.161. (1) The manager shall prepare procedures for the examination of open pit workings including (a) accumulations of loose rock on catchment berms which may endanger persons working below; (b) the height of working face in relation to reach of machine digging it; (d) the condition of roads to working area; (h) the presence of overhangs, face slips and faults in the face. (2) The manager shall prepare procedures for the examination of waste rock dumps including (a) irregularities noted in the dump platform; (b) the adequacy of mixing of rock being dumped; (c) the drainage and water problems; (d) any over-steepening in dump face; (e) the adequacy of berms; (g) the gradient of dump platform; and (h) any safety concerns beyond the toe of the dump. (3) The manager shall prepare procedures for the examination of tailings ponds including (a) the condition of the face of the embankment; (b) signs of seepage; (c) sloughing; (d) the condition of beach; (e) the width of top of embankment; and (f) the depth of water.	Regular inspections are made by shift boss and Technical Services. Yearly inspections completed by consultant (Golder Associates). Mine indicates that procedures are in place for work around crest and toe of pit walls however documented SOP could not be located. Mine indicates that procedures are in place for excavation of stockpiles, however documented SOP could not be located. Mine indicates that procedures are in place for foot traffic on stockpiles, however current SOP do not cover all situations.	Mine is in conformance with the regulation. Mine to develop and submit SOP for work around toes and crest of pit walls. Mine to develop and submit SOP for foot traffic on stockpiles Mine to develop and submit SOP for excavation of stockpiles

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

20160721 – GEOTECHNICAL INSPECTION

September 03, 2016

Martin van Rooy
WSCC Mines Inspector
Iqaluit, Nunavut

Dear Mr. van Rooy:

Further to 20160721 Mary River project electrical and geotechnical inspection reports, please see our response to your inspection.

Best Regards,
Bikash Paul
General Manager

GEOTECHNICAL INSPECTION:

Noticed the mine has restricted access to the danger zone at the crest and toe of pit walls however, the Standard Operating Procedure (SOP) and Job Hazard Analysis (JHA) reviewed contained only limited documentation of this restriction.

1 Please develop an appropriate SOP for all persons and equipment working in the pit and where work is required below a face, it must have prior approval from the geotechnical specialist on site.

RESPONSE:

In progress. Expected completion date: September 30, 2016.

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the SOP and JHA for Milne Inlet's ore stockpile sample and survey work did not clearly articulated Golder's recommendations and warnings concerning working on and excavating stockpile slopes.

2 Please reviewed the SOP and JHA and ensure the recommendations made by Golder, are clearly articulated in the documents.

RESPONSE:

In progress. Expected completion date September 30, 2016

An angle of repose stockpile is only marginally stable, as soon as the toe of the stockpile is excavated the stockpile angle increases and it becomes potentially unstable. As such, no foot traffic should be allowed on a stockpile face once extraction has commenced (even if extraction is no longer occurring). Buried ice and snow also create potentially unstable conditions and no foot traffic should be allowed on stockpiles faces with buried snow or ice that have potentially melted.

3 Please develop an SOP for stockpile extraction for when the excavated face become oversteep due to presence of ice or consolidated material and an SOP for surveying the stockpile that includes no foot access on potentially unstable surfaces.

RESPONSE:

In progress. Expected completion date September 30, 2016

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the following deficiencies noted for the Milne Inlet Quarry:- 1) significant loose on the bench faces, 2) bench width is less than 8m, 3) inadequate berms on the haul roads, and 4) a frozen blast at the south end.

4 Please install berms and post NO-ENTRY signage restricting access to the quarry and perform no work in it until a quarry design compliant with the requirements of the MHSR (e.g Section 1.03 and 1.04) and accepted engineering practice has been approved by WSCC.

RESPONSE:

Berm is installed at the Milne Quarry. August 17, 2016

In progress. Expected completion date November 30, 2016

Noticed the following deficiencies noted for the QMR2 Quarry: - 1) loose across the bench faces, and 2) bench width is less than 8m.

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

5 Please install berms and post NO-ENTRY signage restricting access to the quarry and perform no work in it until a quarry design compliant with the requirements of the MHSR (e.g. Section 1.03 and 1.04) and accepted engineering practice has been approved by WSCC.

RESPONSE:

Berm is installed at QMR2. Installed August 15, 2016

In progress. Expected completion date November 30, 2016.

WSCC Workers' Safety & Compensation Commission | ᐃᖃᓇᐃᔭᖅᑎᓄᑦ ᐊᑦᑕᓇᖅᑐᓂᒃ ᐊᒻᒪ ᓇᓪᓕᐅᑕᒪᓂᒃ ᖃᐅᔨᓴᖅᑎᑦ

20160722

email Sylvain.Proulx@baffinland.com

Sylvain Proulx
Chief Operating Officer
Baffinland Iron Mines Corporation
2275 Upper Middle Road East - Suite 300
Oakville ON L6H 0C3

Dear Mr. Proulx:

Further to the **Mine Health and Safety Act article 26** attached is the 20160922 Mary River project inspection report.

As per **MHSA article**

28. Please post a copy of this inspection report in a conspicuous location, and

29. Advise the chief inspector within 30 days of the remedial measures taken and the remedial measures still to be taken in respect of the inspection report.

32.(1) A person who is adversely affected by a decision or order issued by an inspector may appeal the decision or order, in writing, to the chief inspector within 30 days after its issue.

The WSCC is committed to service excellence. If you have any questions or concerns about this inspection report, please feel free to contact my supervisor Fred Bailey or myself. His phone number is 867 669 4430 or email fred.bailey@wscc.nt.ca.

Sincerely
Workers' Safety and Compensation Commission of the NWT and NU Mine Safety

Martin van Rooy
Engineer/Mines Inspector

cc OHSC c/o tony.noseworthy@baffinland.com hal.finely@baffinland.com

WSCC Workers' Safety & Compensation Commission | ᐃᖅᑲᓇᐃᔭᖅᑎᓄᑦ ᐊᑦᑕᓇᖅᑐᓂᒃ ᐊᒻᒪ ᓇᓪᓚᐅᒃᑯᒫᓂᒃ ᖃᐅᔨᓴᖅᑎᑦ

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Mine:	Mary River project	Location:	~950 km NW of Iqaluit		
Operator:	Baffinland Iron Mines Corp.	Lat.	71-19'N	Long.	79-24'W
Manager:	Sylvain Proulx	Inspection Date:		20160907 to 14	
Address	2275 Upper Middle Road East - Suite 300 Oakville ON L6H 0C3				

Martin van Rooy, WSCC's engineer/mine inspector, conducted a general safety inspection of Baffinland's Milne Inlet and Mary River sites.

Robert Bateman, Steven Campbell, Yvan Deslauriers, Denis Doucet, Mark Ebenal, Darryl Finlay, Jean Gauthier, Adam Gyorffy, Matthew Johnson, Brian Larson, Josh Manning, Kenneth Mullen, Edwin Patten, Justin Prosser, Robert Shea, Anthony Stewart, Matthew Tracey and Dale Wales assisted Martin van Rooy for parts of this inspection

Noticed at the Milne ore stockpile, a man, after contacting the 988-loader operator, walked through the loader's work area. The Loader operator continued loading ore from the stockpile and dumping it into the reclaim feed conveyor hopper while the man was walking through his area. The man, a Levert employee, advised he was aware of Baffinland's operating procedure requiring the loader operator to place the bucket on the ground while he was in the loader's work area.

1 Please ensure loader operators and persons working near loaders are trained and comply with Baffinland's procedure that the loader is parked with the bucket on the ground before a person enters the loader's work area and the bucket remains on the ground while the person is in the loader's work area.

   MHSA article 10. (1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed three 988 loaders working on reclaiming ore feeding reclaim conveyor hoppers at Milne however, these loaders have no visible number on the equipment to identify the operator, before entering his work area.

Date of Report 20160922 **Inspector** ____________

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

2 Please note this is a repeat infraction see inspection report 29 January 2016. Please ensure a loader's identification is clearly visible during day and nighttime operation.

MHSA article 10. (1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed the operator of articulating truck ART 008, leave the ore stockpile area at Milne where the loaders are working and travel on the ore stockpile haul road however, he did not switched his radio to the MTAC channel as required for this area, from the drill and blast (ship loading) channel he was using.

3 Please ensure the boundary between the loader work area and the ore haul road area at Milne's ore stockpile pad, is clearly marked with barricades and signage stating the radio channel to use to permit direct communication with the people in the same work area.

MHSA article 10. (1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed one of the three 988 loaders at the ore pad at Milne and a number of articulating trucks travelling on the Tote road and working at Mary River, are missing either one or both wheel chocks

4 Please ensure rubber tired mobile equipment is equipped with two wheel chocks and the operator, before leaving their equipment in a parked position, blocks one of the unit's wheels with wheel chocks, to prevent unintended movement.

MHSR sect 10.29.(1) *All rubber tired mobile equipment having a gross weight exceeding 7,000 kg and any other piece of equipment specified by the chief inspector, shall have a minimum of two wheel chocks that shall be used when the operator leaves the equipment in a stationary position.*

Noticed an open bottom transformer installed on a wooden base, at the ship loader office. The transformer has no external ground conductor to show it is grounded.

Date of Report 2016 09 22 **Inspector** ____________

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

5 Please place a steel plate below the transformer and install an external ground conductor from XO on the transformer to the generator's ground system.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed a number of electrical cabinets are missing their maximum voltage warning sign i.e. outside the ship loader's office, ship loader 2351-SL-002-CP04, SL002 JB024, 2351-ER-04-DP05, ship loader 1 and 2 construction power supply, Fountain tire shop, panel in seacan next to building #01...

6 Please note this is a repeat infraction see inspection reports 20 July 2016, 12 October 2015... ensure electrical panels installed at Milne Inlet, Tote Road and Mary River are equipped with clear signs warning of the highest voltage hazard present inside the cabinet.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed there are electric cables lying on the upper floor of ship loader 1 and on 2, at the construction power panel area. Also noticed at the construction power panel of ship loader 1, a cover removed from plug-in outlet and a cable connected directly to the outlet's cables.

7 Please review the construction power installation at ship loader 1 and 2 and either remove it or organise it to prevent damage to the cables and equipment. Remove the cable connected to the outlet's cables and replace the outlet cover.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Date of Report 2016 09 22 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the security guard, stationed at the ship loader office, wearing a ring. He was advised that rings must not be worn, while working on site.

8 Please advise all supervisors to ensure they and the persons working under their supervision, are in compliance with Baffinland's policy regarding no wearing of rings while at work.

MHSR sect 8.15.(1) *Where there is a risk of a person coming into contact with moving parts of machinery or with electrically energized equipment or where the work process is such that a similar hazard exists, the person*
(a) shall wear clothing that fits closely about the body;
(b) shall not wear dangling neckwear, bracelets, wrist-watches, rings or similar articles; and
(c) shall confine cranial and facial hair or wear it at a length which will prevent it from being snagged or caught.

Noticed the nip point pulley guards on the sample tower feed conveyor are not installed.

9 Please install the nip point pulley guards

MHSR sect 10.118.(3) *All accessible head, tail, drive and tension pulleys of a conveyor shall be effectively guarded at their nip points and the guards shall extend for a distance of at least 1 m from the nip point.*

Noticed there are some vertical access ladders that require fall protection, i.e. the two ladders to access the walkway across the reclaim conveyor, the two ladders to access the slewing motors platform in tower 002. Noticed the top of the lower vertical ladder to the slewing motor platform finished below the floor making it difficult to access the level or to access the ladder from the floor.

10 Please ensure vertical ladders more than 5 feet high are equipped with fall protection and that their side rails extend at least one meter above the work level the ladder is servicing.

Date of Report 20160922 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 1.98. *Except in an underground mine, a ladderway at an angle steeper than 70 to the horizontal shall be fixed in place and be provided with*
(a) platforms at intervals not greater than 7 m;
(b) a safety cage; or
(c) a protective device that, when used, will prevent a worker from falling.

Noticed the access door on some 600 Volt cabinets were not locked providing easy access to 600 Volt terminals, i.e. 2351-SL-002-CP04, SL002 JB004, 2351-ER-04-DP01, 2351-ER-04-DP05 and in ER-04 there is a cover missing from the panel below starter marked 'Capstan SL002 Dock East side'.

11 Please ensure electrical enclosures are locked or bolted and that they require tools or keys to gain access to the live terminals and cover the opening below the starter.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed there are field revisions drawn on the electrical schematic in ship loader room ER-4.

12 Please have these as-built electrical revisions up-dated on the original drawings and certified.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed four men working on a screening plant at the ore stockpile, all men had locked-out and tagged the screen's master switch however, one man had not written his name on the lock-out tag. The person is a contract employee and had not received Baffinland's lockout training.

Date of Report 20160922 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

13 Please note this is a repeat infraction see inspection report 19 May 2016, 20 Dec. 2014... ensure every person on site, authorized to work on equipment, is trained and complies with Baffinland's lockout procedure.

MHSR sect 10.22.(1) *Locks and tags shall be issued to each person who works on machinery or equipment that has to be locked out.*

(2) *Tags issued to individual persons shall contain space for the recording of the person's name, the type of work being performed, the date and time the work was started and the name of the supervisor in charge.*

(3) *Where equipment is to be locked out, each person working on the equipment shall be responsible for affixing his or her own lock and tag to the lock-out device and for removing them on the completion of the work.*

Noticed Baffinland has supplemented its own work force with contract personnel. However, some of these contractors are not complying with Baffinland's work procedures. As noted in
item 1, a man walking through the loader's work area without the loader bucket on the ground and the loader operator not keeping the bucket on the ground while the man was in his work area,
item 3, an operator not switching his radio channel to the new work area, and
item 12, a man not completing his lockout tag information.

14 Please ensure all contract personnel are qualified, trained and comply with all Baffinland's procedures applicable to their work.

MHSA art 15. *Where a contractor performs work at a mine, the contractor, the employee or officer of the contractor in charge of the work of the contractor at the mine and the owner and manager of the mine shall, in respect of the work of the contractor at the mine,*
(a) take every reasonable measure and precaution to protect the health and safety of employees of the contractor, employees of the mine and other persons at the mine; and
(b) comply with, and ensure that other persons comply with, this Act and the regulations and any applicable orders or directives issued under this Act or the regulations.

Date of Report 20160922 **Inspector** ______________________

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the cables and hoses were lying indiscriminately among the large jack stands at Milne's mobile maintenance shop, creating a trip hazard.

15 Please note this is a repeat infraction see inspection report 12 Oct 2015, 21... Please ensure no supervisor allows electrical cords, hoses and other items... to lie indiscriminately and without protection over the ground or across a floor where they are a potential trip hazard and or other hazard if un-intentionally cut or damaged.

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed a mechanic working on ore haul truck OHT 24 however, he had not locked out the equipment.

16 Please ensure all persons working with or on equipment are trained in the lockout procedure and apply their individual lock and tag to the lockout system, before working on the equipment.

MHSR sect 10.22.(1) *Locks and tags shall be issued to each person who works on machinery or equipment that has to be locked out.*

(2) *Tags issued to individual persons shall contain space for the recording of the person's name, the type of work being performed, the date and time the work was started and the name of the supervisor in charge.*

(3) *Where equipment is to be locked out, each person working on the equipment shall be responsible for affixing his or her own lock and tag to the lock-out device and for removing them on the completion of the work.*

Date of Report 2016 09 22 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed there is no simple and clear instruction sheet on the wall of the Milne power plant, on the procedure to follow to start-up the power plant and this could be a problem, for an inexperienced operator.

17 Please develop a clear and simple start up instruction sheet for the Milne power plant and for the Mary River power plant and post it in the power plant.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed the fire pump system at Milne had settled further since the May 2016 inspection, increasing the strain on the diesel fire pump exhaust bellows and the fire pumps' piping system. It was also noted that the diesel fire pump had not run since May 2016 because of concerns by the operator, of potential fire line breakage. The operator also advised misalignment between the electric motor and fire pump had damaged the membrane in the electric fire pump's coupling.

On September 10, 2016 at about 6:30 am, instructions were issued to Baffinland to correct without further delay, the Milne fire pump problems. Baffinland advised on September 16, 2016 that the alignment of fire line piping and equipment were completed and the fire pumps were now safe to run without concern of fire line breakage from the settlement.

18 Please review the settlement problems in Milne's water treatment plant and implement a permanent solution, to stop the fire pump system settlement problems.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed extension cords and air hoses lying indiscriminately across the floor of Milne's Fountain Tire shop and there is no clear access to the electrical panel on the wall as it is blocked by a heater hose, a wheel rim and rings.

Date of Report 2016 09 22 **Inspector** ____________

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

19 Please remove the clutter in front of the electrical panel and provide 1-meter clear access to the panel. Remove the extension cords and hoses lying indiscriminately on the floor and provide retractable reels for the hoses and cables for service from above the work area or organize them in orderly manner on the floor with their lines covered

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed Baffinland has received new ore haul trucks and trailers. These units have larger tire diameters than the other ore haul units therefore, the berms along the Tote road must be raised to ¾ the height of the larger tires. Also noticed a berm is required at ~km 10 and the berms at km 34-35, ~42.5 and ~80 are very low. At ~km 57 there is a blind corner and call sign is required to warn oncoming traffic.

20 Please submit a copy of Baffinland's design standard for the Tote road's berms and ensure all sections of the Tote road, where a vehicle could lose control if it went off the road, are bermed to ¾ the height of the largest ore haul tire used on the road. Ensure call signs are installed North and South of blind corners and blind hills.

MHSR sect 1.143.(1) *The manager shall ensure that surface haulage roads are designed, constructed and maintained to provide*
(a) a travel width where dual lane traffic exists, of not less than three times, or where single lane traffic exists, of not less than two times the width of the widest haulage vehicle used on the road; and
(b) a shoulder barrier
(i) at least 3/4 the height of the largest tire on any vehicle using the road,
(ii) of a construction or a specification that is acceptable to the chief inspector

Noticed the Winterhaven water pumphouse at Mary River needs a clean-up

Date of Report 2016 09 22 **Inspector** ______

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

21 Please clean-up the Winterhaven pump house.

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed in the helicopter garage, a stack of pickets are placed in front of the fire extinguisher, the terminals of a storage battery are uncovered and there is an electrical panel with no maximum voltage warning sign and with an open hole in the bottom of the panel.

22 Please ensure clear and unobstructed access is maintained to fire extinguishers, cover the storage battery terminals, plug the electrical cabinet's open hole and affix a maximum voltage sign to it.

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed the extension cords used to power the Herman Nelson heaters in Nuna workshop and in the Mary River warehouse.

23 Please provide an outlet at each heater and plug the heater directly into the outlet. Remove the extension cords.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Date of Report 20160922 **Inspector** [signature]

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the switches in the electrical panel in Mary River's service garage dry, have no labels plus there is an open slot in the panel and it is missing its maximum voltage sign.

24 Please label the circuit the switch services, cover the open slot and affix a maximum voltage sign

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines.*

Noticed the 16" x 1¾" reinforcing of the 8" x 8" main roof beam of Mary River electrical shop, is not installed continuous between the columns as per the design drawings thereby not achieving the designed beam strength required.

25 Please consult with the design engineer and have him submit a certified drawing showing how to correct the construction error.

MHSR sect 10.01.(1) *All mechanical equipment used at mines shall be*
(a) designed in accordance with good engineering practice;
(b) constructed in accordance with a design and plans that have been certified by a professional engineer; and
(c) acceptable to the chief inspector.

Noticed the hammer and drill bits for the Caterpillar MD6290 drill, are stored in the bit grinding shop at Mary River. The hammer weighs approximately 230-pound and the drill bits about 50-pounds and these are manually hauled from inside the shop onto a truck and then onto the drill. This manual manipulation of the hammer and or drill bits is of concern because of the heavy weights involved in this awkward installation work.

Date of Report 2016 09 22 **Inspector** [signature]

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REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

26 Please review the complete bit and hammer handling cycle, to/from the storage, to/from the drill, to/from the bit grinding shop, other... to ensure effective protection is provided for any person exposed to the risk of injury from manually handling this equipment. In addition, ensure each person engaged in the bit and hammer handling cycle, receives routine training in manual lifting procedure(s).

MHSR sect 9.72.(1) *The manager shall ensure that suitable mechanical equipment is provided and used for the handling of heavy or awkward loads.*

(2) *Where the use of mechanical equipment is not practicable, the manager shall take all practical means to adapt heavy or awkward loads to facilitate lifting, holding or transporting by employees or to otherwise minimize the manual handling required.*

Noticed the materials stored in the electrical room of the bit grinding shop, blocked ready access to the electrical equipment in the room.

27 Please remove the stored material and maintain at least one-meter clear working space about the electrical equipment.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines*

Noticed the long extension cords used at crushing and screening plants 'A', 'B' and 'C'.

28 Please provide convenient outlets in and around the areas where the extension cords are used, plug the equipment directly into the outlet and remove the long extension cords.

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines*

Date of Report 2016 09 22 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Noticed the open cardboard containers stored on the floor in Mary River's mobile maintenance shop warehouse, are a potential fire hazard.

29 Please remove the cardboard containers and other combustible products and minimize the potential fire hazard in this area.

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed the small propane torch gas bottles are stored in a 45-gallon drum in Mary River's mobile maintenance shop. This is a concern, as the propane from a leaking bottle would accumulate in the 45-gallon drum awaiting ignition. The shop supervisor was advised to move the 45-gallon drum outside and provide vent holes in the bottom of the drum to prevent propane accumulation.

30 Please ensure empty or full propane cylinders/bottles when not in use, are stored outside in a well-ventilated area

MHSR sect 10.101.(1) *All gas fired appliances, equipment and pipelines shall be installed and maintained in accordance with the standard CAN/CGA-B149.1-M95, Natural Gas Installation Code and CAN/CGA-B149.2-M95, Propane Installation Code, and the system shall comply with the requirements of the Gas Protection Act and the regulations under that Act.*

Noticed a new crane is replacing the crane on the back of service truck parked in the mobile maintenance shop however, the replacement crane is not an exact duplicate of the old crane.

31 Please ensure a professional engineer certifies the replacement crane and replaces the load chart and

Date of Report 2016 09 22 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

crane decals on the truck for the existing crane with the new crane's data.

MHSR sect 10.128.(2) *A new or used crane, shovel, dragline, boom truck or similar type of equipment that uses a rope or cable to raise, lower or swing a load or materials during its work cycle shall not be put into service unless*
(a) a certificate has been obtained from the manufacturer or from a professional engineer competent in the design of hoisting equipment, certifying
(i) the maximum load capacity and maximum operating speed of the hoisting or lifting system, and
(ii) that all critical load-bearing components of the complete assembly and accessories have been inspected and non-destructively tested; and
(b) all the commissioning tests have been successfully completed.

Noticed there are extension cords and air hoses lying indiscriminately across the floor at Fountain Tire's work area in the mobile maintenance shop.

32 Please remove the extension cords and hoses lying indiscriminately on the floor and provide retractable reels for the hoses and cables for service from above the work area or organize them in orderly manner on the floor with their lines covered

MHSR sect 9.04. *The manager shall develop and implement an effective housekeeping program to ensure that*
(a) all worksites and travelways are maintained in a safe condition;
(b) materials and equipment are stored in a manner so as not to endanger persons; and
(c) appropriate action is taken whenever necessary to maintain a hazard-free environment.

Noticed ore haul truck OHT 29 cab is equipped with a high-pressure air hose with a blowgun attached for cleaning. There is no sign in the cab warning of the hazard of using compressed air for cleaning and the PPE required while using high-pressure air for cleaning. A high-pressure air blowgun was also removed from a Baffinland toolbox in the mobile equipment service garage.

33 Please note this is a repeat infraction see inspection report 29 Jan 2016. Please direct all supervisors

Date of Report 20160922 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

to remove high-pressure air blowguns from service including the ore haul trucks and as previously noted review the practice of using compressed air for cleaning and where this procedure is required, ensure-

a) a safe work procedure is developed that addresses without limiting, personal protective equipment, hearing protection, maximum air pressure to the blowgun, barricades around the work area...

b) people, authorized to use high-pressure air for cleaning, are trained in this safe work procedure,

c) submit a copy of the safe work procedure for using high-pressure air for cleaning, and

d) identify the areas where an ***authorized person*** may use high-pressure air for cleaning.

MHSR sect 10.121.(1) *The manager shall identify and supply all suitable personal protective equipment to be worn by the operator for the safe operation of all miscellaneous tools including grinders, chain saws, pneumatic tools and all power activated tools.*

(2) *No person shall use any miscellaneous tool unless*

(a) the person is trained and authorized to use the tool;

(b) the person is wearing, and has received training on, the proper personal protective equipment required for the safe operation of the equipment; and

(c) the personal protective equipment is in good condition.

Noticed ore haul truck OHT 12 was allowed to run in the mobile maintenance shop for some time to build-up brake line air pressure however, the engine's exhaust is not ducted out of the building causing exhaust fumes to build up in the shop.

34 Please review alternate means of charging-up the ore haul truck's brake line air pressure such as plant compressed air, to avoid discharging the truck's engine exhaust into the shop.

MHSR sect 10.59.(2) *The exhaust of an internal combustion engine that is temporarily or permanently operating within a building on the surface shall be conducted to a point outside the building and prevented from*

(a) re-entering the building;

(b) entering the intake of any compressor;

Date of Report 2016 09 22 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

(c) contaminating the atmosphere of another building; or
(d) contaminating mine workings.

Noticed in the various shops at Milne and Mary River, hoses, welding cable and extension cords are placed on the floor for work reasons however, on the floor these items become trip hazards and are damaged or cut by men or equipment traveling over them or material falling on them.

35 Please ensure hoses, cables, extension cords... are placed in an organized manner on the floor of the shop and are covered to minimize the trip hazard and protect them from damage alternatively where feasible us vertical drop lines to avoid placing them on the floor.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed the panic bar on the exit door of the Mary River welding shop is still broken making it difficult to open the exit door however, this was noted as repaired in Baffinland's response of April 20, 2016 to item 21 of inspection report 20160129.

36 Please repair the Mary River welding shop exit door panic bar.

MHSR sect 1.159.(1) *The manager shall prepare a procedure for the examination of worksites that provides for examination*
(i) of the emergency arrangements including safe means of egress;

Noticed an open slot in electrical panel 4521.3 PNL 002A in the Mary River welding shop.

37 Please cover the open slot in the electrical panel

Date of Report 20160922 **Inspector** [signature]

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

MHSR sect 13.01.(2) *Except where otherwise required by these regulations, the electrical system and electrical equipment shall meet or exceed the requirements of CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines*

Date of Report 20160922 **Inspector** [signature]

Baffinland

20170228

Martin van Rooy
Engineer/Mines Inspector
WSCC
Iqaluit, Nunavut

Dear Mr. van Rooy:

Further to your letter of outstanding government orders, please see responses for completed orders in this letter.

Robert Gagne
General Manager

1. Order # 20160129-10 cleaning with compressed air is not allowed at Bim - complete.
2. Order #20160129 – 16 A new tank with a fuseable link has been installed – complete
3. Order #20160921 – 19 the fountain tire shop has been cleaned up and material removed from in front of the electrical panel – complete
4. Order #20160921 – 29 The cardboard containers and other combustible products have been removed – complete
5. Order #20160921 – 32 The extension cords and air hoses have been removed and are stored neatly – complete
6. Order #20160921 – 33 All of the OHTs have been checked and the air hoses removed from each unit – complete
7. Order #20160921 – 34 All air tanks are retrofitted to use shop compressed air rather than run the truck – complete
8. Order #20160921 – 35 All hoses, cables and extension cords are picked up and stored neatly – complete
9. Order #20160921 – 30 The drum of small propane bottles has been moved outside and vented – complete
10. Order #20160129 – 13 the single line schematics are posted in the electrical rooms and will be updated whenever there are changes – complete
11. Order #20160519 – 21 The hotsy has been checked and verified to be compliant – complete
12. Order #20160721 – 01 – a single line diagram has been posted on the wall of Milne power house B – complete
13. Order #20160721 – 08 the enclosure is repaired which allows to the door to be closed – complete
14. Order #20160721 – 09 – Grounding has been installed in accordance with CSA M421-11 clause 4.4.5.2.2 – complete
15. Order #20160721- 10 This is complete on the one on the pad and the spare one will be done before bringing it on operation – complete for the one on the pad
16. Order #20160721 – 11 This unit removed from service – complete
17. Order #20160721 – 12 This unit removed from service – complete
18. Order #20160721 – 15 This is complete
19. Order #20160721 – 16 – this is complete
20. Order #20160721 – 17 Electrical outlets have been installed - complete
21. Order #20160721 – 19 – this is done on the one on the pad and the spare one will be done before bringing it in operation – complete for the one on the pad
22. Order #20160721 – 30

23. Order #20160922 – 21 Weatherhaven pump house has been cleaned up – complete
24. Order #20160922- 22 Items completed
25. Order #20160922 – 23 Outlets have been installed and extension cords removed – complete
26. Order #20160922 – 24 Items completed
27. Order #20160721 – 03 The items have been removed from in front of the electrical panels – complete
28. Order #20160922 – 04 All units have been fitted with two wheel chocks – complete
29. Order #20160519 – 19 Vacuum cleaners are now in each drill – complete
30. Order #20160721 – 06 Complete
31. Order #20160922 – 26 See attached procedure – complete
32. Order #20160721 - 01 See attached SOPs – complete
33. Order #20160721 – 02 See attached SOPs – complete
34. Order #20160721 – 03 See attached SOPs – complete
35. Order #20160721 – 05 No entry signs have been erected and quarry design criteria has been submitted to and approved by WSCC – complete
36. Order#20160922 – 27 Area is cleaned up and material removed from in front of the electrical equipment – complete
37. Order #20160922 – 08 Memo has been issued to all personal that jewelry is not to be worn while at work – complete
38. Order #20160922 – 36 Door has been repaired – complete.
39. Order #20160922 – 11 Complete
40. Order #20160922 – 12 Complete

APPENDIX D.7.7
FOLLOW-UP SPILL REPORTS

February 05, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0
Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-006, Reported on Jan 6th, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At approximately 07:30 on January 06, 2016, the crusher operator was starting up the equipment on the B-Spread Crusher at the Mine Site Crusher Pad and the belt gave way and broke. This resulted in the belt coming in contact with the lube oil return line on the Tertiary cone, causing the line to release lube oil to the adjacent area. The volume of the spill was approximately 120L covering an approximate area of 4 m^2. The spill location is > 100 m from the nearest drainage (non-fisheries habitat) and all water bodies are currently frozen.

Immediate and Follow-Up Action:

The Crusher Supervisor and Environment Department were notified immediately upon spill discovery. The lube oil was contained and cleaned up with spill pads and the contaminated material was placed in Quatrex bags. The contaminated material from the impacted area was removed for disposal in the Landfarm Facility at Milne Port.

Recommendations:

The belt broke due to a catastrophic failure. Preventative maintenance and inspection programs for the various components of the crusher are in the process of being fully implemented.

Current Status:

The Crusher lube oil return line was repaired and the crusher is currently operational. The affected area has been cleaned up and the contaminated material disposed of.

Should you require further information or clarification on the above noted spill, please feel free to contact Allan Knight at (647) 253-0596 x6010 or Jim Millard at (902) 403-1337.

Prepared By:

Bill Bowden

Bill Bowden
Environmental Coordinator

Reviewed by:

Jim Millard
Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Erik Madsen, Oliver Curran, Bernard Laflamme, Tony Woodfine, Bikash Paul, Allan Knight, (Baffinland), Erik Allain, Scott Burgess (AANDC).

Photo 1 – Spill Location Pre Clean up

Photo 2 – Spill Location Post Clean up

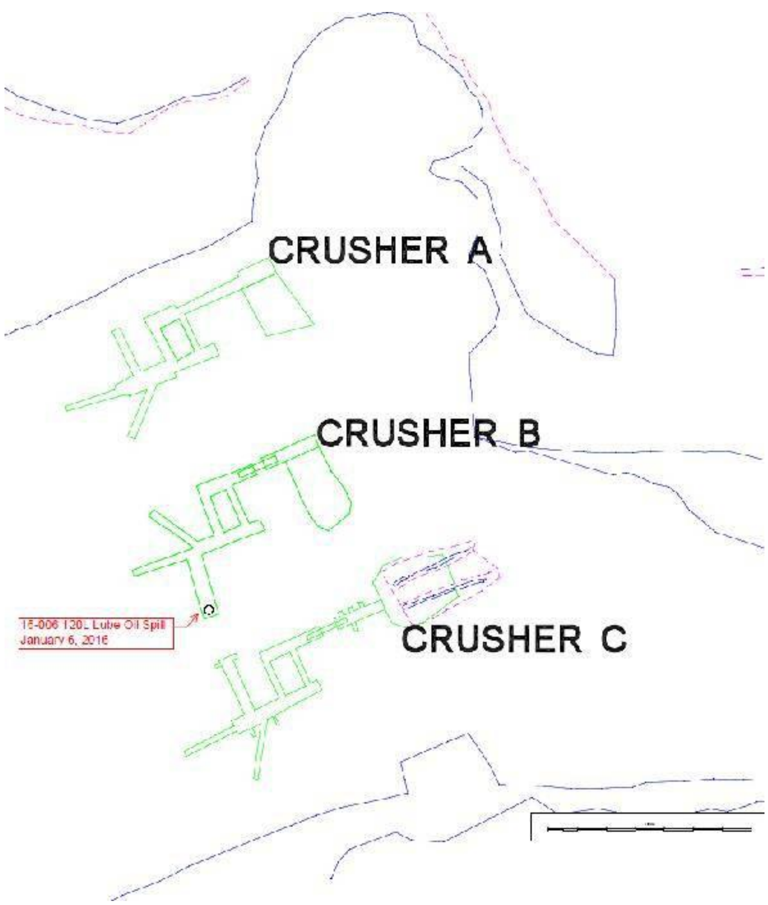

Figure 1 - Spill Location

Northwest Territories Nunavut Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR Jan 06, 2015	REPORT TIME 21:30	☒ ORIGINAL SPILL REPORT, OR ☒ UPDATE # 1 TO THE ORIGINAL SPILL REPORT	REPORT NUMBER 16 - 006
B	OCCURRENCE DATE: MONTH – DAY – YEAR Jan 06, 2015	OCCURRENCE TIME 07:30		

C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Project Mine Site, Baffin Island, NU	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES 71 MINUTES 18 SECONDS 40	LONGITUDE DEGREES 79 MINUTES 16 SECONDS 27
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3
G	ANY CONTRACTOR INVOLVED No	CONTRACTOR ADDRESS OR OFFICE LOCATION NA

H	PRODUCT SPILLED Lube Oil	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 120L	U.N. NUMBER NA
	SECOND PRODUCT SPILLED (IF APPLICABLE) NA	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES NA	U.N. NUMBER NA
I	SPILL SOURCE Oil return line	SPILL CAUSE Drive belt worn out	AREA OF CONTAMINATION IN SQUARE METRES 4m2
J	FACTORS AFFECTING SPILL OR RECOVERY Frozen ground conditions	DESCRIBE ANY ASSISTANCE REQUIRED NA	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT None.

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At approximately 07:30 on January 06, 2016, the crusher operator was just starting up the equipment on B-Spread at the Mine Site Crusher Pad and the belt gave way and broke, causing the belt to come contact with the lube oil return line on the Tertiary cone, causing the equipment to spill estimated 120L of Lube Oil on the ground. The operator put down spill pads to contain the product, soon after he reported the spill to his supervisor then the Environment Department. The spill location is > 100 m from the nearest drainage (non-fisheries habitat) and all water bodies are currently frozen. The spill was cleaned up with pads and the spill area excavated. The impacted material will be transported to the Landfarm Facility at Milne Port.

L	REPORTED TO SPILL LINE BY Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE Ext 6016
M	ANY ALTERNATE CONTACT Allan Knight	POSITION Env. Superintendent	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Off Site	ALTERNATE TELEPHONE 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 2 – NT-NU Spill Report

Baffinland

March 27, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0
Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-056, Reported on Feb 26th, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

On February 26, 2016 at 5:30 HRS, a worker discovered that the cube van (truck) had leaked approximately 120 litres of diesel onto the ground underneath the vehicle, affecting an area of approximately 10 m2. Upon further inspection, it was determined that the vehicle's fuel line had become damaged and had leaked the contents of the vehicle's fuel tank onto the ground. The location of the spill was greater than 200 meters away from the nearest water body, Milne Inlet, which is currently frozen.

Immediate and Follow-Up Action:

The worker immediately placed spill pads underneath the vehicle to absorb any free product and notified the Environment Department and his Supervisor. Contaminated snow and soil were removed and transported to the Milne Port Landfarm Facility for treatment.

Recommendations:

Routine maintenance will continue to be conducted on all onsite mobile equipment. All mobile equipment operators will continue to conduct pre-operation checks every shift to confirm their equipment has no leaks and is in good working order.

Current Status:

The cube van (truck) fuel line has been repaired and is back in operation. The affected area has been cleaned up and the contaminated snow and soil have been taken to the Milne Port Landfarm Facility for treatment.

Should you require further information or clarification on the above noted spill, please feel free to contact Allan Knight at (647) 253-0596 x6010 or Jim Millard at (902) 403-1337.

Prepared By:

Andrew Vermeer
Environmental Coordinator

Reviewed by:

Jim Millard
Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Oliver Curran, Bernard Laflamme, Tony Woodfine, Bikash Paul, Allan Knight, William Bowden, Lea Willemse, Jennifer St. Paul-Butler (Baffinland),
Erik Allain, Scott Burgess (AANDC)

Baffinland

Photo 1 - Cube Van Diesel Spill – 120 L

Photo 2 – Spill Cleanup

Photo 3 – Spill Location after Cleanup

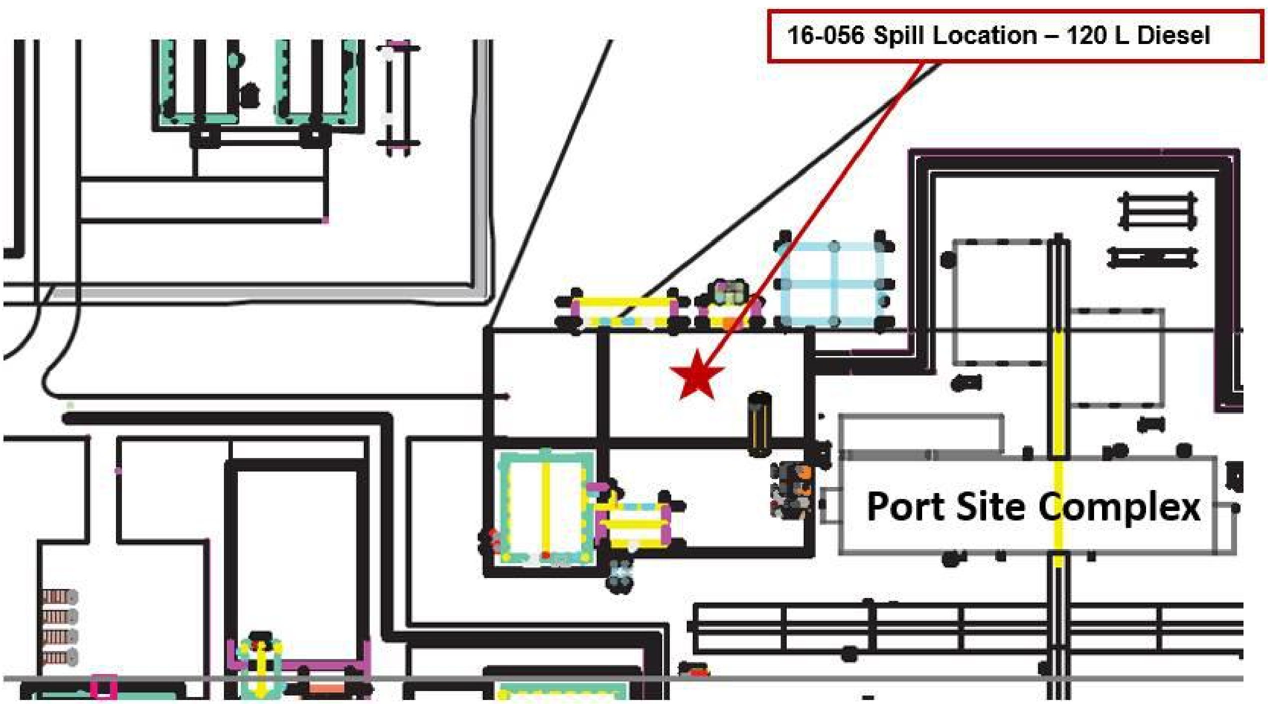

Figure 1 – Spill Location

Baffinland

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 02-26-2016	REPORT TIME: 20:00 HRS	X ORIGINAL SPILL REPORT, OR	REPORT NUMBER: 16 - 056
B	OCCURRENCE DATE: MONTH – DAY – YEAR: 02-26-2016	OCCURRENCE TIME: 05:30 HRS	☐ UPDATE # ___ TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Project Milne Port, Baffin Island, NU	REGION: ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 53 SECONDS 05	LONGITUDE: DEGREES 80 MINUTES 53 SECONDS 17		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Arctic Diesel (P50)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: 120 L	U.N. NUMBER: N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: Mobile Equip - Cube Van	SPILL CAUSE: Damaged Fuel Line	AREA OF CONTAMINATION IN SQUARE METRES: 10 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY: Frozen gravel ground surface	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: None	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On February 26, 2016, a worker discovered that the cube van (truck) had leaked approximately 120 L of diesel onto the ground underneath the vehicle, affecting an area of approximately 10 m2. The worker immediately placed spill pads underneath the vehicle to absorb any free product and notified the Environment Department. Upon further inspection, it was determined that the vehicle's fuel line had become damaged and had leaked the contents of the vehicle's fuel tank onto the ground. Contaminated snow and soil were removed and transported to the Milne Port Landfarm Facility for treatment. The location of the spill was greater than 200 meters away from the nearest water body, Milne Inlet, which is currently frozen. The investigation is currently ongoing.

Further details will be provided in the follow up report.

L	REPORTED TO SPILL LINE BY: Jim Millard	POSITION: Env. Manager	EMPLOYER: Baffinland	LOCATION CALLING FROM: Mine Site ext 6016	TELEPHONE: 647-253-0596
M	ANY ALTERNATE CONTACT: Allan Knight	POSITION: Env. Superintendent	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: Mine Site	ALTERNATE TELEPHONE: as above.

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF ___

Figure 2 – NT-NU Spill Report

March 31, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0
Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Acting Manager, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-063, Reported on March 1st, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At approximately 02:00 on March 01, 2016, the crusher operator for A-Spread noticed a spill under the cone crusher. A lubricant hose came lose and discharged a volume of lube oil onto the crusher pad surface. The operator shut down the crusher immediately and initiated notification and clean-up measures. The volume of the spill was approximately 300L covering an approximate area of 5 m^2. The spill location is > 100 m from the nearest drainage (non-fisheries habitat) and all water bodies are currently frozen and ice covered.

Immediate and Follow-Up Action:

The Crusher Supervisor and Environment Department were notified immediately upon spill discovery. The lube oil was contained and cleaned up with spill pads. The spill area was then excavated and the contaminated material was placed in Quatrex bags. The contaminated material from the impacted area was removed for disposal in the Landfarm Facility at Milne Port.

Recommendations:

Preventative maintenance inspection programs for the various components of the crusher are in the process of being fully implemented.

Current Status:

The lubricant oil hose was tightened and clamps replaced. Crusher A is currently operational. The affected area has been cleaned up and the contaminated material disposed of.

Should you require further information or clarification on the above noted spill, please feel free to contact Allan Knight at (647) 253-0596 x6016 or Jim Millard at (902) 403-1337.

Prepared By:

William Bowden
Environmental Coordinator

Reviewed by:

Jim Millard
Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Erik Madsen, Bernard Laflamme, Bikash Paul, Allan Knight, (Baffinland),
Erik Allain, Scott Burgess (AANDC).

Photo 1 – Spill Location

Photo 2 – Location of Hose Failure

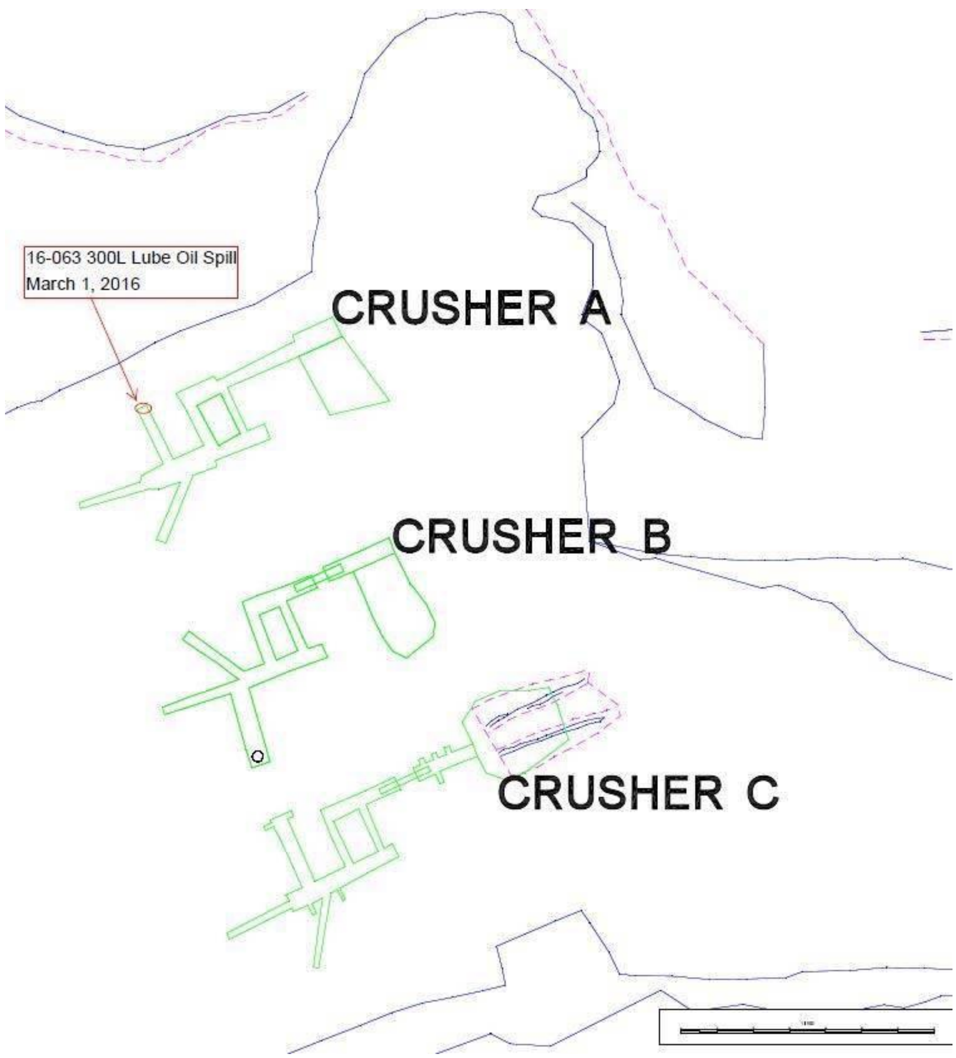

Figure 1 - Spill Location

Northwest Territories Nunavut Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR Mar 01, 2016	REPORT TIME 19:00 HRS	☒ ORIGINAL SPILL REPORT, OR ☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER 16 - 063
B	OCCURRENCE DATE: MONTH – DAY – YEAR Mar 01, 2016	OCCURRENCE TIME 02:00 HRS		
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Project Mine Site, Baffin Island, NU	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 18 SECONDS 40	LONGITUDE DEGREES 79 MINUTES 16 SECONDS 27		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED No	CONTRACTOR ADDRESS OR OFFICE LOCATION NA		
H	PRODUCT SPILLED Lube Oil	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 300 L	U.N. NUMBER NA	
	SECOND PRODUCT SPILLED (IF APPLICABLE) NA	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES NA	U.N. NUMBER NA	
I	SPILL SOURCE Lube Oil Hose	SPILL CAUSE Hose coupler came loose.	AREA OF CONTAMINATION IN SQUARE METRES 6m2	
J	FACTORS AFFECTING SPILL OR RECOVERY Frozen ground conditions	DESCRIBE ANY ASSISTANCE REQUIRED NA	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT None.	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At approximately 02:00 on March 01, 2016, the crusher operator for A-Spread noticed a spill under the cone crusher. The hose came lose and discharged a volume of lube oil onto the crusher pad surface. The operator shut down the plant immediately and initiated notification and clean-up measures. The spill location is > 100 m from the nearest drainage (non-fisheries habitat) and all water bodies are currently frozen and ice covered. The immediate cause of the spill was a coupling/o-ring failure. The spill was cleaned up with pads and the spill area excavated. The impacted material is temporarily stored in two quatrex bags and will be transported to the Landfarm Facility at Milne Port for treatment.

L	REPORTED TO SPILL LINE BY Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE Ext 6016
M	ANY ALTERNATE CONTACT Allan Knight	POSITION Env. Superintendent	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Off Site	ALTERNATE TELEPHONE 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 2 – NT-NU Spill Report

April 2, 2016

Resource Management Officer
Nunavut Field Operations
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Box 100
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Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-065, Reported on March 3, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

On March 3, 2016 at approximately 13:00, while completing routine daily inspections of sewer lines and lift stations a release of grey water was discovered at lift station 19, located between the office and kitchen complexes of the Mine Site Complex. Upon further investigation, the lift station float switch had malfunctioned, causing an overflow which resulted in 100 Litres of grey water to slowly leak onto the adjacent ground surface. An area of approximately $10m^2$ was impacted. The location of the spill was on the Mine Site camp pad, is greater than 100 meters from the nearest watercourse and all water bodies are currently frozen and ice covered.

Immediate and Follow-Up Action:

Fixed Plant Maintenance and the Environment Department were immediately notified. The vacuum truck was used to empty the lift station and remove any pooling grey water. The pumps were shut off and the float was system was replaced.

Recommendations:

Routine inspections of the sewage lines and lift stations will continue to be completed to ensure all components of the sewage system are functioning as designed.

Current Status:

The lift station float switch was replaced shortly after the spill was reported and the lift station is back in service and functioning properly.

Should you require further information or clarification on the above noted spill, please feel free to contact Allan Knight at (647) 253-0596 x6010 or Jim Millard at (902) 403-1337.

Prepared By:

William Bowden,
Environmental Coordinator

Reviewed by:

Jim Millard
Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Erik Madsen, Bernard Laflamme, Bikash Paul, Allan Knight, Anant Minhas, (Baffinland)
Scott Burgess, Erik Allain, (AANDC)

Photo 1 – Lift Station Spill

Photo 2 – Lift Station Spill Post Clean Up

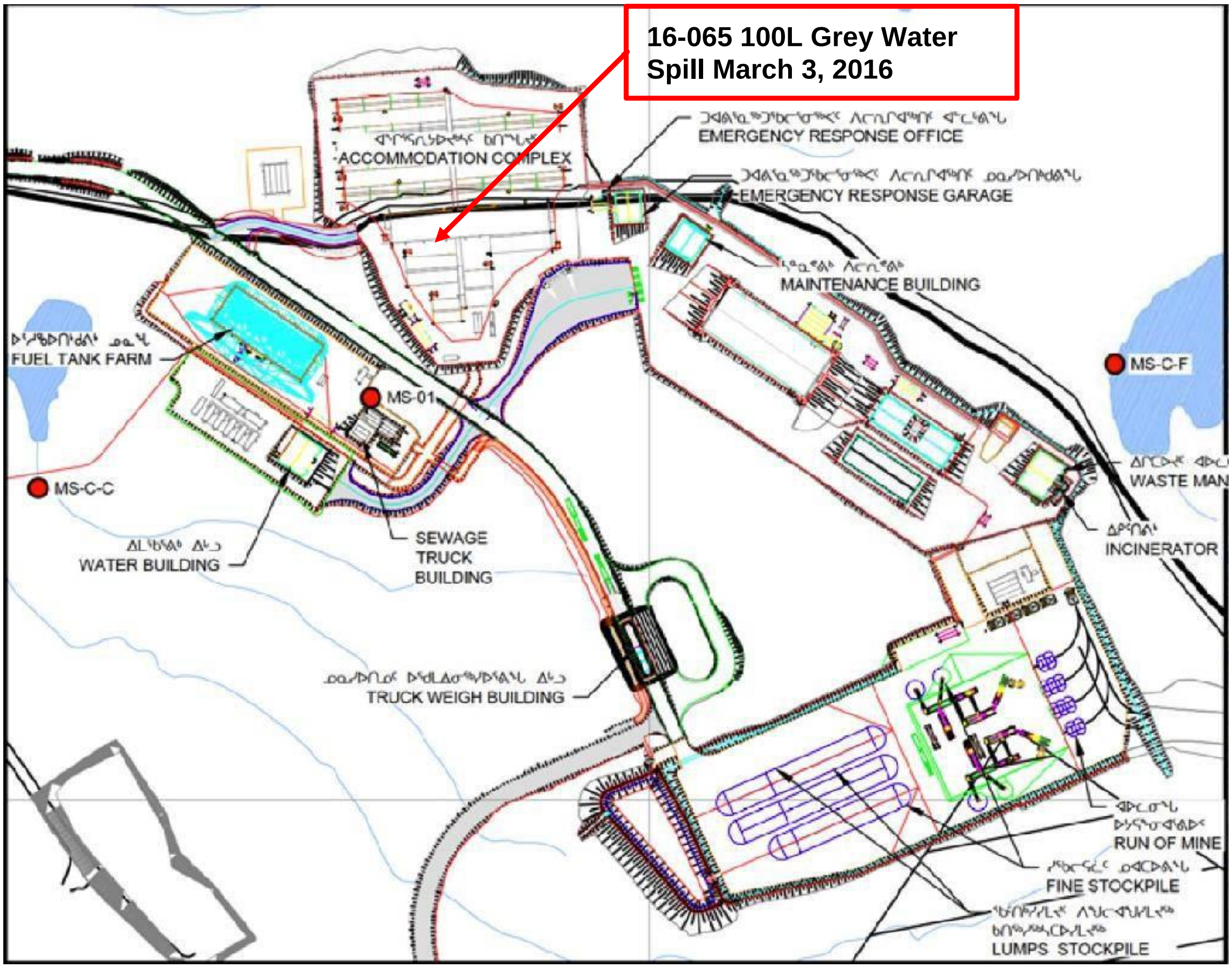

Figure 1 - Spill Location

Northwest Territories Nunavut Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 04-03-2016	REPORT TIME 11:30 HRS	X ORIGINAL SPILL REPORT, OR	REPORT NUMBER 16 - 065
B	OCCURRENCE DATE: MONTH – DAY – YEAR 03-03-2016	OCCURRENCE TIME 13:00 HRS	☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mine Site Kitchen Lift Station 19	REGION ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 18 SECONDS 53	LONGITUDE DEGREES 79 MINUTES 17 SECONDS 01		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A		
H	PRODUCT SPILLED Grey Water	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 100L	U.N. NUMBER N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A	
I	SPILL SOURCE Lift Station	SPILL CAUSE Suspected fitting failure	AREA OF CONTAMINATION IN SQUARE METRES 10 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY Spill Adjacent to Infrastructure	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At 13:00 HRS on March 3, 2016, a grey water leak was discovered by Fixed Plant Maintenance originating from the MSC Kitchen North Lift Station 19. The Environment Department was notified upon discovery, and the lift station pumps were shut off. A vacuum truck was called to pump the lift station out. Initial investigation did not yield the exact cause of the spill but it is suspected that the influent gravity line fitting to the lift station is damaged. Approximately 100 L of grey water was released onto the adjacent ground, affecting an area of approximately 10 m2. Fixed Plant Maintenance will repair or replace the tank or fitting. The location of the spill was on the Mine Site camp pad and is greater than 100 metres from the closest water body. The investigation is currently ongoing and further details of the incident will be provided in the follow-up report.

L	REPORTED TO SPILL LINE BY William Bowden	POSITION Env. Coordinator	EMPLOYER Baffinland	LOCATION CALLING FROM Mine Site, NU	TELEPHONE ext. 6010
M	ANY ALTERNATE CONTACT Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Mine Site, NU	ALTERNATE TELEPHONE ext. 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF ______

Figure 2 – NT-NU Spill Report

Baffinland

May 3, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
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Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
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Re: Follow-up to Spill #16-109, Reported on April 5th, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At approximately 17:00 on April 04, 2016, a spill was identified while environmental personnel were doing an inventory of hazardous waste berms at the Mary River Mine Site. It is estimated that 140L of used engine oil was released into the berm covering an approximate area of $3m^2$. The used oil was housed in a plastic drum which had a puncture in the bottom causing it to slowly leak out into the engineered lined containment berm. The spill location is > 100 m from the nearest drainage (non-fisheries habitat) and all water bodies are currently frozen and ice covered.

Immediate and Follow-Up Action:

Environmental personnel placed the leaking drum in tertiary containment (spill tray). Site services then cleaned up contaminated snow and residual oil with shovel and placed material in quatrex bag. The contaminated snow from the impacted area was removed for disposal in the Landfarm Facility at Milne Port.

Recommendations:

Proper placement of hazardous materials within line containment structures has been addressed with responsible departments.

Current Status:

Clean up of berms has commenced. Numerous used oil totes have been moved to MS-HWB-7.

Should you require further information or clarification on the above noted spill, please feel free to contact Allan Knight at (647) 253-0596 x6016 or Jim Millard at (902) 403-1337.

Prepared By:

William Bowden
Environmental Coordinator

Reviewed by:

Baffinland
Jim Millard
Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Erik Madsen, Bernard Laflamme, Bikash Paul, Allan Knight,Todd Burlingame (Baffinland), Erik Allain, Scott Burgess (AANDC).

Photo 1 – Spill Location

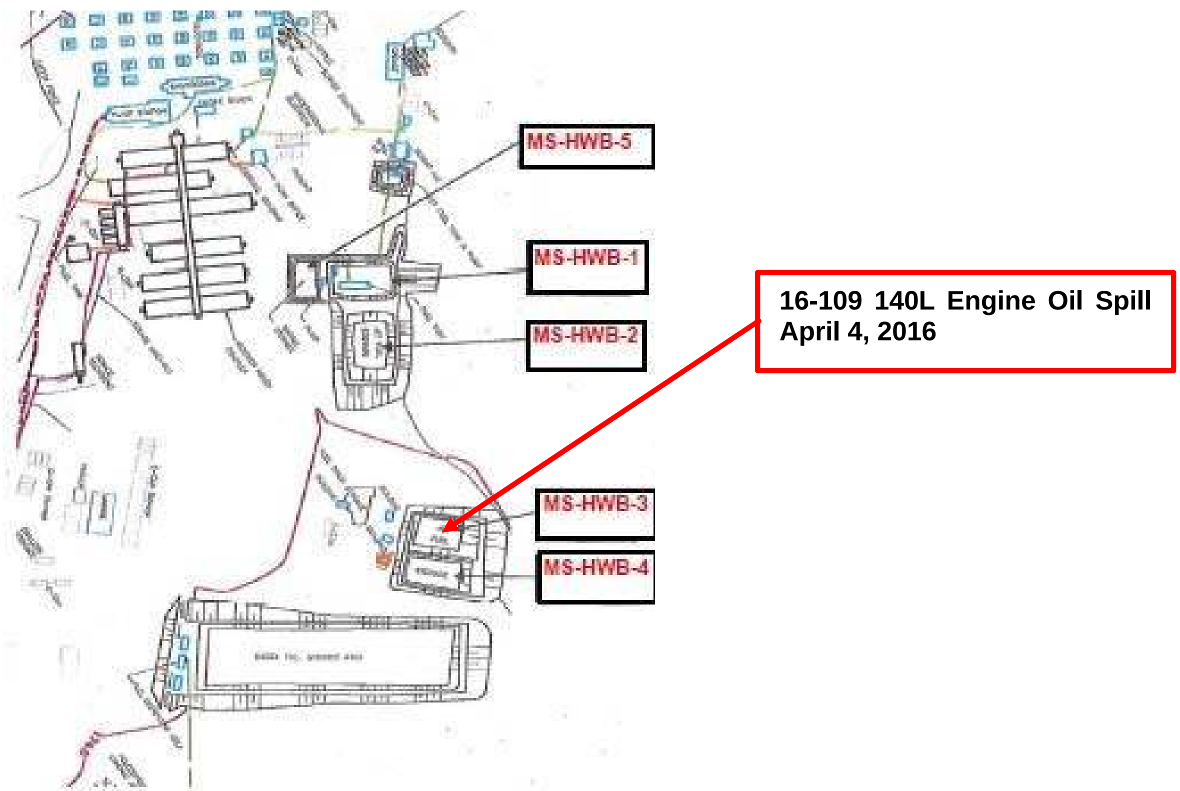

Figure 1 - Spill Location

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

Northwest Territories · Nunavut · Canada

NT-NU 24-HOUR SPILL REPORT LINE
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FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR Apr 05, 2016	REPORT TIME 17:00 HRS	X ORIGINAL SPILL REPORT, OR	REPORT NUMBER 16 - 109
B	OCCURRENCE DATE: MONTH – DAY – YEAR Apr 04, 2016 (spill found)	OCCURRENCE TIME 17:00 HRS	☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A" Amendment No. 1		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Project Mine Site, Baffin Island, NU	REGION ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 19 SECONDS 34	LONGITUDE DEGREES 79 MINUTES 22 SECONDS 08		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED No	CONTRACTOR ADDRESS OR OFFICE LOCATION NA		
H	PRODUCT SPILLED Used Engine Oil	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 140 L	U.N. NUMBER NA	
	SECOND PRODUCT SPILLED (IF APPLICABLE) NA	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES NA	U.N. NUMBER NA	
I	SPILL SOURCE Plastic Drum	SPILL CAUSE Puncture in plastic drum	AREA OF CONTAMINATION IN SQUARE METRES	
J	FACTORS AFFECTING SPILL OR RECOVERY Frozen ground conditions	DESCRIBE ANY ASSISTANCE REQUIRED NA	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT None.	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At approximately 17:00 on April 04, 2016, a spill was identified while environmental personnel were doing an inventory of hazardous waste berms on site. It is estimated that 140L of used engine oil was released into the berm. The used oil was housed in a plastic drum which had a puncture in the bottom causing it to slowly leak out into the berm. The leaking drum was placed in tertiary containment and stored in a lined berm. The contaminated material is currently being cleaned up and placed in a quatrex bag and will be transported to the Landfarm Facility at Milne Port for treatment. The spill location is within engineered lined containment and is > 100 m from the nearest drainage (non-fisheries habitat). All water bodies are currently frozen and ice covered.

L	REPORTED TO SPILL LINE BY Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE Ext 6016
M	ANY ALTERNATE CONTACT Allan Knight	POSITION Env. Superintendent	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Off Site	ALTERNATE TELEPHONE 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 2 – NT-NU Spill Report

June 2, 2016

Resource Management Officer
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Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-149, Reported on May 3rd, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At approximately 13:45 on May 3, 2016, an Ore Haul Truck (OHT) Operator began the fueling process at the Milne Port Diesel Fuel Module by engaging the module's fuel pump. Before he started fuel transfer (filling the OHT fuel tank), the Operator noticed that the pump's meter display had already began counting, yet there was no fuel flowing from the nozzle he was about to use. The Operator began to investigate why the meter was running when he noticed that fuel was flowing from the secondary fuel nozzle, accessed through the adjacent (north) roll-up door into the diesel module (refer to Photo 1). The Operator immediately pressed the emergency shut-off switch which stopped the flow of fuel and called Site Services.

By visual assessment, it was estimated that approximately 300 L of diesel fuel was released into the sea container module. While the fuel was observed to be fully contained within the structure (refer to Photo 2), upon snowmelt further assessment will be completed to determine the extent of a potential release to the surrounding constructed containment berm in which the module is located. The assessment cannot be completed at this time since the east side of the module is inaccessible to snow removal equipment. The location of the spill was fully contained within constructed secondary containment and is greater than 200 meters away from the nearest water body, Milne Inlet, which is currently frozen.

Immediate and Follow-Up Action:

Site Services, Fixed Plant Maintenance and Environment Department personnel responded to the incident. Upon their arrival at the module, Fixed Plant Personnel confirmed the source of the release by placing a 5 gal pail under the suspect nozzle and "jogging" the pump. The Fixed Plant team then ensured that the isolation/ball valve supplying fuel to this fuel line was closed and secured, followed by replacing the faulty fuel nozzle affixed to the fuel line. A lock-out of the isolation/ball valve supplying fuel to this fuel line was also applied.

Recommendations:

The following recommendations have been developed from the responsible departments:

- Removal of the Fuel Management Systems (FMS) electrical bypass that authorizes unrecorded fueling activities. Removing the bypass will re-assign user accountability when using the module and identify potential losses to the environment (i.e. overflows); and

- Installation of a surveillance camera to provide 24/7 surveillance of the area.

Current Status:

The Fuel Module's faulty fuel nozzle has been replaced and the fuel line remains locked-out as per proper Baffinland procedure. To provide an additional control, the isolation/ball valve also remains locked-out.

While there appears to be no ground contamination to the area east of the module, further assessment will be completed on the west side, at which time where practical, clean-up of the area will be completed.

Re-installation of the electrical bypass will be completed at a later date in summer of 2016 as this requires work to be completed by a qualified professional/ third party contractor.

The surveillance camera and ancillary support parts (mounting brackets) have been procured and ordered. Upon receipt at site, installation of the camera will be completed.

Should you require further information or clarification on the above noted spill, please feel free to contact Allan Knight at (647) 253-0596 x6010 or Jim Millard at (902) 403-1337.

Prepared by: Reviewed by:

Allan Knight
Environmental Superintendent

James Millard
Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Todd Burlingame, Sylvain Proulx, Bikash Paul, Allan Knight, William Bowden, Andrew Vermeer, Jennifer St. Paul-Butler (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess (INAC)

Baffinland

Photo 1 - Source of release – Secondary (back-up) fuel supply line

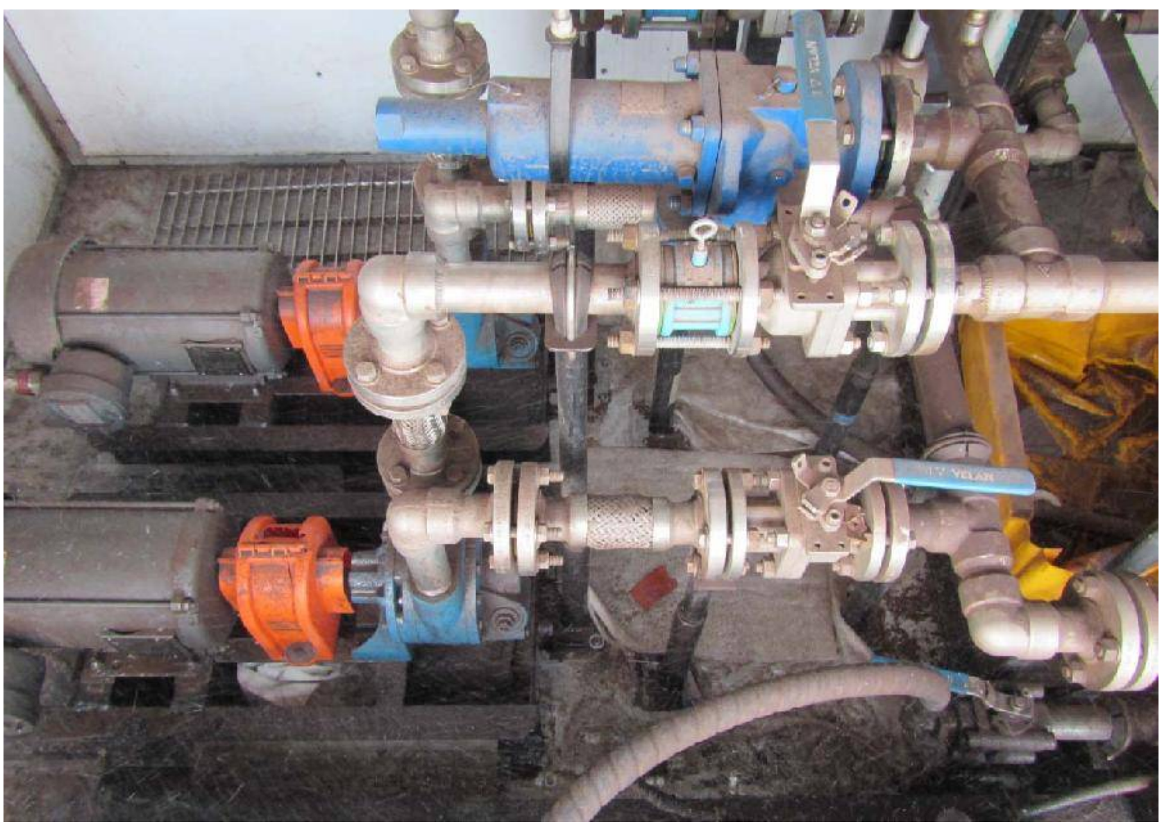

Photo 2 – Spill Contained within Module

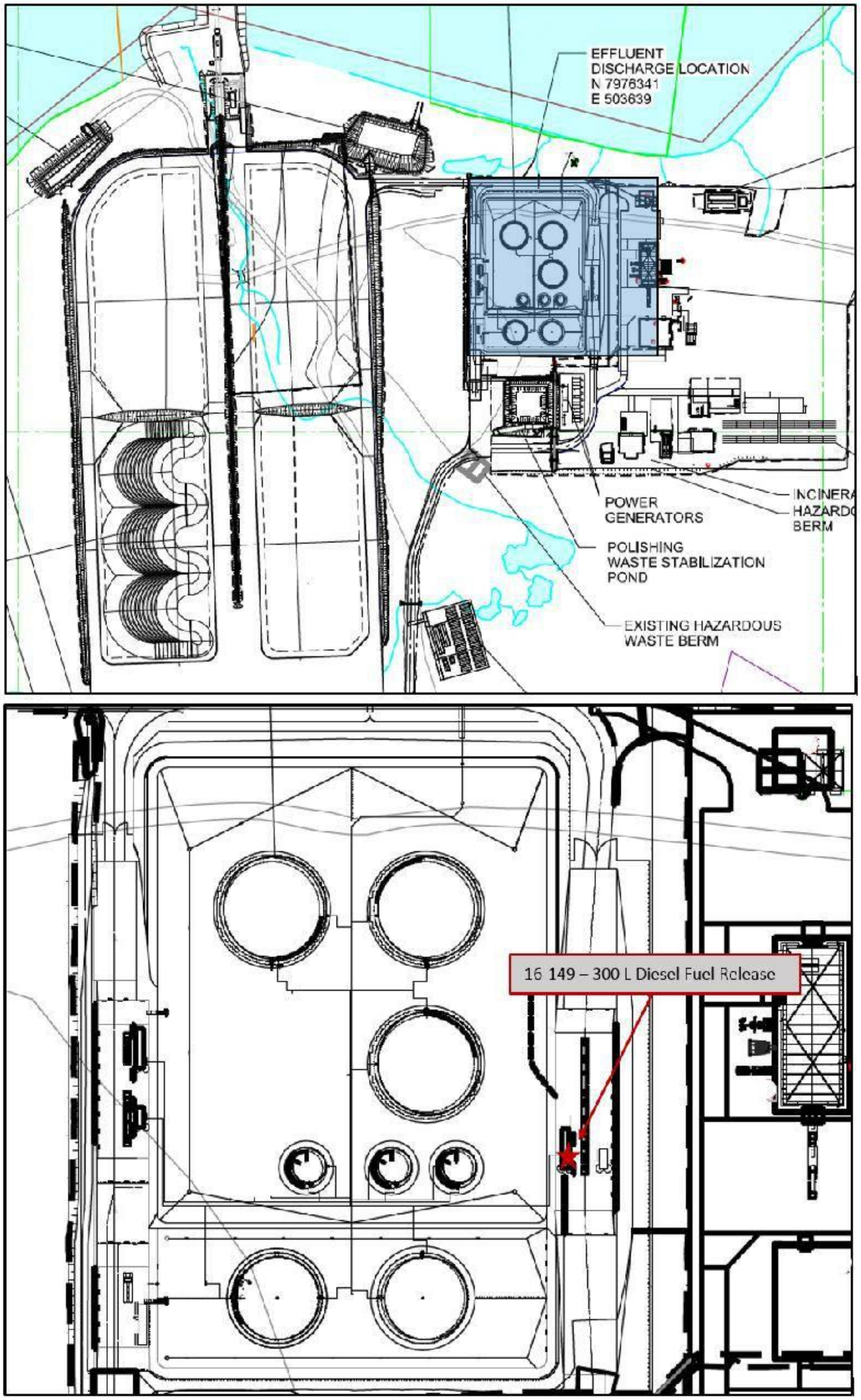

Figure 1 – Spill Location

Baffinland

Northwest Territories · Nunavut · Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 05-03-2016	REPORT TIME 17:45	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # ____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER 16 - 149
B	OCCURRENCE DATE: MONTH – DAY – YEAR 05-03-2016	OCCURRENCE TIME 13:45		
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Project Milne Port, Baffin Island, NU	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 53 SECONDS 08	LONGITUDE DEGREES 80 MINUTES 53 SECONDS 34		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A		
H	PRODUCT SPILLED Arctic Diesel (P50)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 300 L	U.N. NUMBER N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A	
I	SPILL SOURCE Diesel Fuel Line/Nozzle	SPILL CAUSE Damaged Fuel Nozzle	AREA OF CONTAMINATION IN SQUARE METRES Potential Area - TBD	
J	FACTORS AFFECTING SPILL OR RECOVERY Inside Sea Container Module	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At approximately 13:45 on May 3, 2016, an Ore Haul Truck Operator began the fueling process by engaging the fuel pump at the Baffinland Milne Port P-50 Diesel Fuel Module. Before he started to pump the fuel, the Operator noticed that the pump's meter had already began counting, yet there was no fuel flowing from the nozzle he was about to use. The Operator began to investigate why the meter was running when he noticed that fuel was flowing from a secondary fuel nozzle into the diesel module. The Operator pressed the emergency shut-off switch which stopped the flow of fuel and called Site Services.

By visual observation, it was estimated that approx. 300 L of diesel fuel was released into the sea container module, and while the fuel was observed to be fully contained within the structure, further assessment will be completed to determine if any volume of fuel was released to the surrounding constructed engineered containment berm in which the module is located.

L	REPORTED TO SPILL LINE BY Jim Millard	POSITION Env Manager	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE 647-253-0596
M	ANY ALTERNATE CONTACT Allan Knight	POSITION Env Superintendent	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Mary River	ALTERNATE TELEPHONE Ext 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Figure 2 – NT-NU Spill Report

Baffinland

June 13, 2016

Resource Management Officer
Nunavut Field Operations
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Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-159, Reported on May 10th, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

On May 10, 2016 at 10:00, during transport along the Mary River Tote Road, an Ore Haul Truck (OHT) Operator ran over a metal mud-flap bracket puncturing a small hole in the bottom of the passenger side diesel fuel tank. The operator continued to drive a distance before he was notified by Site Personnel approaching from behind that he was leaking diesel fuel at which time the Operator immediately pulled over to assess the leak at Km 37.

A 5 gal pail was used to provide immediate containment while Site Personnel retrieved a nearby spill kit. The initial spill trail was approximately 100L and the release to the area adjacent to the truck at km 37 was estimated to be 150L based on the area of the spill. The remaining diesel contained in the tank was collected with 5 gal pails and transferred to 200L drums. Absorbent pads and socks were used to absorb fuel spilled to the surrounding area.

Immediate and Follow-Up Action:

Site Environment was notified and arrived to assess the spill. Upon their arrival, the spill was contained and clean-up efforts were underway. The OHT was relocated a few meters forward to allow better access for clean-up efforts. Absorbent pads and booms were used to clean-up residual fuel spilled on the Tote Road, contaminated material was taken to the Milne Inlet Landfarm.

An assessment of the Tote Road was completed to determine the area of impact to the ground from the release of fuel from the OHT fuel tank while in transport. The impact was determined to be negligible as the truck was travelling at 45 km/h while releasing a spray-like release, which due to evaporation and dispersion the release was not visibly detectable along most of the distance the truck travelled.

Recommendations:

Awareness programs educating Site Personnel of the risks (to safety and equipment/ tires) of foreign objects on the Tote Road and site roadways to be implemented at site.

Current Status:

On camp road and laydowns, magnetic rollers are used to clean up small metal items, and Awareness programs have been delivered to site personnel.

Should you require further information or clarification on the above noted spill, please feel free to contact Allan Knight at (647) 253-0596 x6010 or Jim Millard at (902) 403-1337.

Prepared By:

Allan Knight

Allan Knight
Environmental Superintendent

Attach: Photos, Map, NT-NU Spill Report

cc. Todd Burlingame, Sylvain Proulx, Bikash Paul, Jim Millard, Andrew Vermeer, Jennifer St. Paul-Butler (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess (INAC)

Photo 1 - Source of release – Ore Haul Truck Fuel Tank

Photo 2 – Spill Area

Baffinland

Figure 1 – Spill Location

Baffinland

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

Northwest Territories | Nunavut | Canada

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 05-10-2016	REPORT TIME 10:00 HRS	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # ___ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER 16 - 159
B	OCCURRENCE DATE: MONTH – DAY – YEAR 05-10-2016	OCCURRENCE TIME 10:00 HRS		
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Project Milne Port, Baffin Island, NU	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 38 SECONDS 39	LONGITUDE DEGREES 80 MINUTES 22 SECONDS 52		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A		
H	PRODUCT SPILLED Arctic Diesel (P50)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES Approx. 250 L	U.N. NUMBER N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A	
I	SPILL SOURCE Diesel Fuel Tank	SPILL CAUSE Punctured Fuel Tank	AREA OF CONTAMINATION IN SQUARE METRES Approx. 20 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY N/A	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS May 10, 2016 at 10:00, During transport along the Mary River Tote Road, an Ore Haul Truck Operator ran over a metal mud-flap bracket puncturing a small hole in the bottom of the passenger side diesel fuel tank. The operator continued to drive a distance before he was notified by Site Personnel approaching from behind that he was leaking diesel fuel at which time the Operator immediately pulled over to assess the leak. A 5 gal pail was used to provide immediate containment while Site Personnel retrieved a nearby spill kit. The initial spill trail was approximately 100L and the release to the area adjacent to the truck was estimated to be 150L based on the area of the spill. The diesel still contained in the tank was collected with 5 gal pails and transferred to 200 L drums. Absorbent pads and socks were used to absorb fuel spilled to the surrounding area. Further clean-up of the area is ongoing. Clean-up details will be provided in the follow-up report.			

L	REPORTED TO SPILL LINE BY Allan Knight	POSITION Env Superintendent	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE 647-253-0596
M	ANY ALTERNATE CONTACT Jim Millard	POSITION Env Manager	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Mary River	ALTERNATE TELEPHONE Ext 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Figure 2 – NT-NU Spill Report

June 28, 2016

Resource Management Officer
Nunavut Field Operations
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Manager, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-195, Reported on May 26th, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:
On May 26th, 17:00, during an inspection of the Mine Site Old Fuel Bladder Farm (HWB 7), a spill of used oil was observed inside the bermed facility. The spill is entirely contained within the engineered lined containment that is inspected bi-annually by a qualified Geotechnical Engineer. An inspection around the foot of the berm of the facility indicated no leakage to the environment. Upon inspection, one $1m^3$ tote was discovered punctured, which drained into the berm. The spill location is greater than 500 meters from the nearest water body and occurred on Inuit Owned Land.

Immediate and Follow-Up Action:

The Oily Water Separator (OWS) was employed to treat the contaminated water in the berm starting June 14, 2016 and has processed 355 M^3 to date. Contaminated water processing is ongoing. Clean up of the free product used oil in the berm will be completed utilising a hydrocarbon skimmer. The berm is storage to numerous 1 m^3 totes containing used hydrocarbons awaiting backhaul for proper disposal during the 2016 backhaul sealift.

Recommendations:

Proper stacking and placement of all hazardous materials within line containment structures has been communicated to all responsible departments. A longer term waste management strategy is in development.

Current Status:

The OWS is currently processing the contaminated water in the berm. Final cleanup of the released used oil will be completed utilising a hydrocarbon skimmer in combination with the OWS. Until that time, the integrity of the engineered lined containment is being monitored to ensure there is no release to the receiving environment outside of containment.

Should you require further information or clarification on the above noted spill, please feel free to contact Trevor Myers / Allan Knight at (647) 253-0596 x6010 or Jim Millard at (902) 403-1337.

Prepared By:

William Bowden
Environmental Coordinator

Reviewed by:

Jim Millard, M.Sc., P.Geo.
Environmental Manager

Attach: Map, NT-NU Spill Report

cc. Todd Burlingame, Jim Millard, Allan Knight, Wayne McPhee, Sylvain Proulx, Bikash Paul (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess (INAC)

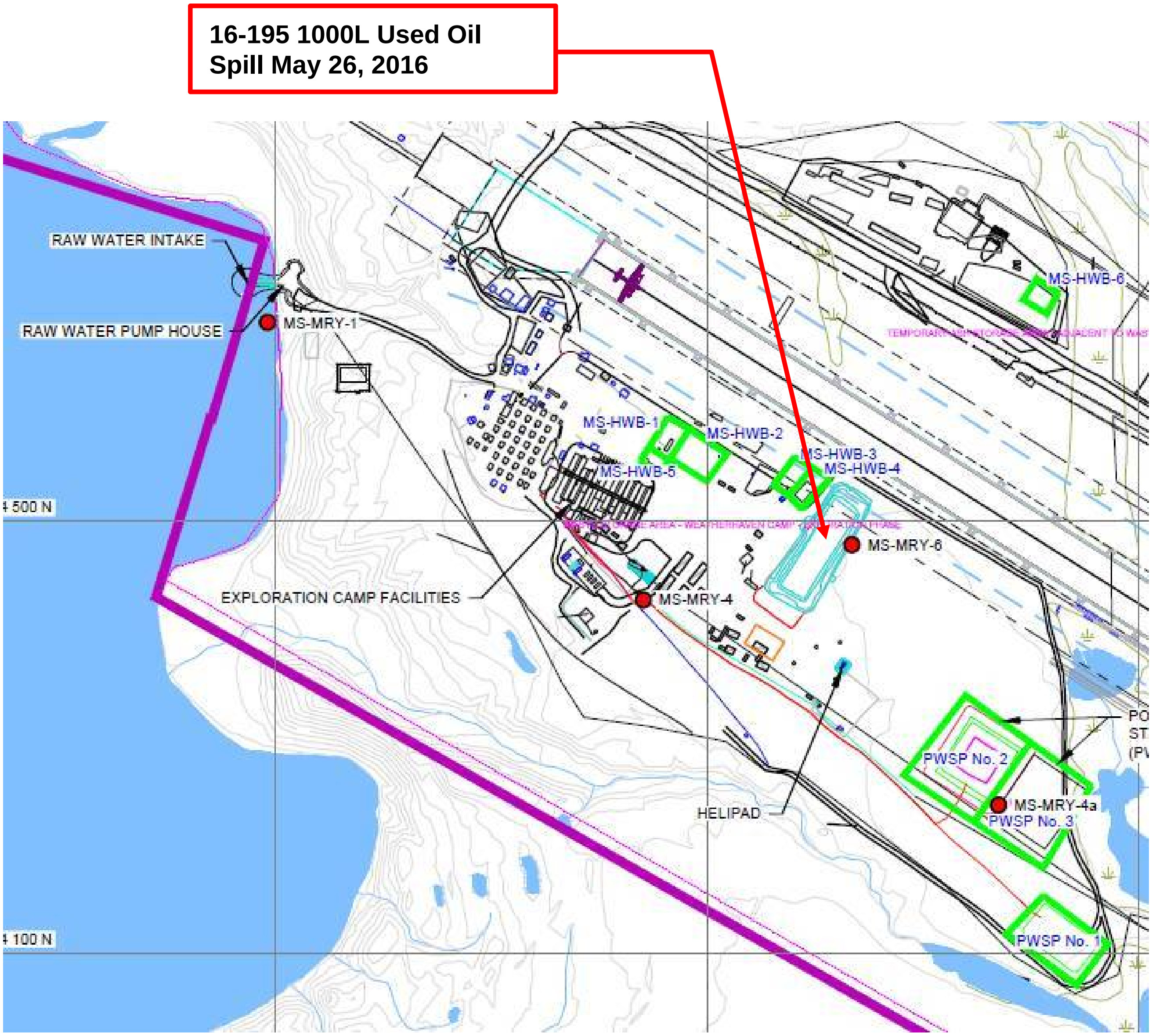

Figure 1: Map of Spill Location

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 05-26-2016	REPORT TIME: 17:00:00 hrs	X ORIGINAL SPILL REPORT, OR	REPORT NUMBER: 16 - 195
B	OCCURRENCE DATE: MONTH – DAY – YEAR: unknown	OCCURRENCE TIME: unkown	☐ UPDATE # ____ TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Mine Site, Baffin Island, NU	REGION: ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 19 SECONDS 31	LONGITUDE: DEGREES 79 MINUTES 22 SECONDS 08		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Waste Oil	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: 1 M3	U.N. NUMBER: N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: Punctured waste oil tote in berm	SPILL CAUSE: Punctured tote	AREA OF CONTAMINATION IN SQUARE METRES: approx. 200m2	
J	FACTORS AFFECTING SPILL OR RECOVERY: On water/ice/snow in lined berm	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On May 26 2016, a spill was discovered during routine inspections of the Mine Site Hazardous Waste Berm #7 (HWB7). Upon initial investigation, the source of the spill was from a punctured waste oil tote (1 m3). The spill is entirely contained within the HWB7 which is constructed within engineered lined containment that is inspected annually by a qualified Geotechnical Engineer. The facility is located >500 m from the nearest water body and occurred on Inuit owned land. Initial estimates of product release was <1 m3. The free phase product will be recovered from the water surface once the ice and snow in the berm melts out. Further details will be provided of the clean up in the follow-up report. This spill is being reported as required by the conditions of Water Licence No. 2AM-MRY1325, Part H , item 9 (b).

L	REPORTED TO SPILL LINE BY: Jim Millard	POSITION: Env. Manager	EMPLOYER: Baffinland	LOCATION CALLING FROM: Mary River	TELEPHONE: 647-253-0596
M	ANY ALTERNATE CONTACT: Allan Knight	POSITION: Env. Superintendent	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: 902-403-1337	ALTERNATE TELEPHONE: 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF ____

Figure 2: NT-NU Spill Report

July 7, 2016

Resource Management Officer
Nunavut Field Operations
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Box 100
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Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-210, Reported on June 7, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At 10:30 HRS on June 6, 2016, a grey water leak was discovered originating from the MSC Kitchen South Lift Station 19. The Environment Department was notified upon discovery, and the lift station pumps were shut off. A vacuum truck was called to pump the lift station out. Initial investigation determined the discharge line form the lift station had separated. Approximately 1 m^3 of grey water was released onto the adjacent ground, affecting an area of approximately 10 m2. The location of the spill was on the Mine Site camp pad and is greater than 100 metres from the closest water body.

Immediate and Follow-Up Action:

Fixed Plant Maintenance and the Environment Department were immediately notified. The lift station pumps were turned off and the vacuum truck was used to empty the lift station and remove any pooling grey water. The discharge pipe from the tank had separated.

Recommendations:

Routine inspections of the sewage lines and lift stations will continue to be completed to ensure all components of the sewage system are functioning as designed.

Current Status:

The lift station discharge pipe was replaced was replaced shortly after the spill was reported and the lift station is back in service and functioning properly.

Should you require further information or clarification on the above noted spill, please feel free to contact Allan Knight at (647) 253-0596 x6010 or Jim Millard at (902) 403-1337.

Prepared By:

Allan Knight,
Environmental Superintendent

Reviewed by:

Jim Millard
Environmental Manager

Attach: Map, NT-NU Spill Report

cc. Todd Burlingame, Wayne McPhee, Sylvain Proulx, Bikash Paul, Jim Millard (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess (INAC)

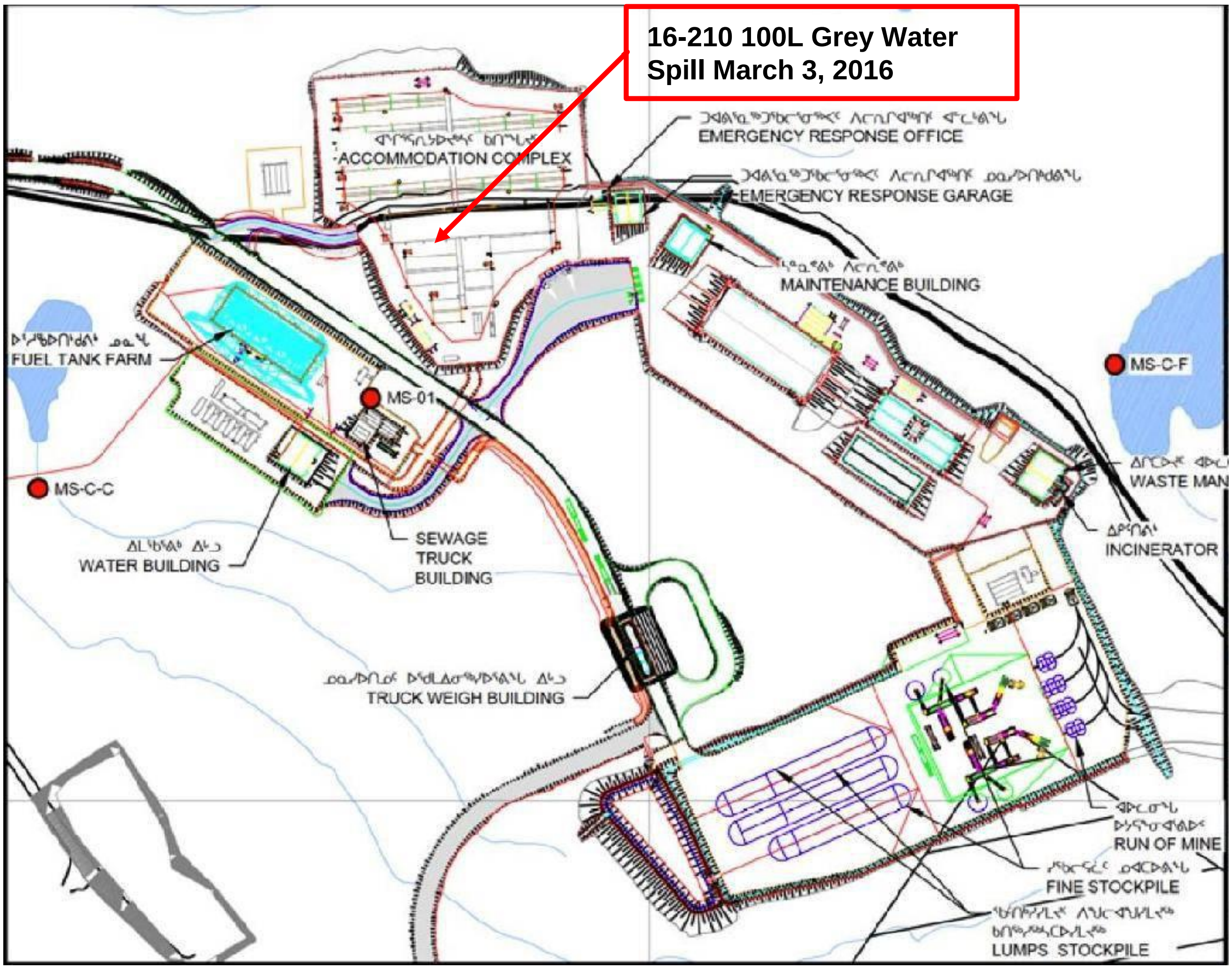

Figure 1 - Spill Location

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

Northwest Territories · Nunavut · Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

REPORT LINE USE ONLY

A REPORT DATE: MONTH – DAY – YEAR: 06-07-2016 | REPORT TIME: 10:30 HRS | ☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # TO THE ORIGINAL SPILL REPORT | REPORT NUMBER: 16 - 210

B OCCURRENCE DATE: MONTH – DAY – YEAR: 06-06-2016 | OCCURRENCE TIME: Unknown

C LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease: Q13C301 | WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"

D GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Mine Site, Baffin Island, NU | REGION: ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN

E LATITUDE: DEGREES 71 MINUTES 18 SECONDS 53 | LONGITUDE: DEGREES 79 MINUTES 17 SECONDS 01

F RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp. | RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3

G ANY CONTRACTOR INVOLVED: N/A | CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A

H PRODUCT SPILLED: Grey Water | QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: 1 cubic meter | U.N. NUMBER: N/A
SECOND PRODUCT SPILLED (IF APPLICABLE): N/A | QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A | U.N. NUMBER: N/A

I SPILL SOURCE: Lift Station | SPILL CAUSE: Fitting Failure | AREA OF CONTAMINATION IN SQUARE METRES: 10 m2

J FACTORS AFFECTING SPILL OR RECOVERY: Spill Adjacent to Infrastructure | DESCRIBE ANY ASSISTANCE REQUIRED: N/A | HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: N/A

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At 10:30 HRS on June 6, 2016, a grey water leak was discovered originating from the MSC Kitchen South Lift Station 19. The Environment Department was notified upon discovery, and the lift station pumps were shut off. A vacuum truck was called to pump the lift station out. Initial investigation determined the discharge line form the lift station had separated. Approximately 1 m3 of grey water was released onto the adjacent ground, affecting an area of approximately 10 m2. The location of the spill was on the Mine Site camp pad and is greater than 100 metres from the closest water body. The investigation is currently ongoing and further details of the incident will be provided in the follow-up report.

L REPORTED TO SPILL LINE BY: Allan Knight | POSITION: Env. Superintendent | EMPLOYER: Baffinland | LOCATION CALLING FROM: 647-253-0596 | TELEPHONE: ext. 6016

M ANY ALTERNATE CONTACT: Jim Millard | POSITION: Env. Manager | EMPLOYER: Baffinland | ALTERNATE CONTACT LOCATION: Off Site | ALTERNATE TELEPHONE: 902-403-1337

REPORT LINE USE ONLY

N RECEIVED AT SPILL LINE BY | POSITION: STATION OPERATOR | EMPLOYER | LOCATION CALLED: YELLOWKNIFE, NT | REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF ______

Figure 2 – NT-NU Spill Report

August 16, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
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Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Manager, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-063, Reported on July 17, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

See attached spill report. On July 16, 2016 at 16:00 HRS, the operator of a CAT 390 excavator discovered that his unit was leaking hydraulic oil at a high rate. The excavator was situated on the working bench of the Deposit No. 1 Pit. The operator immediately shut down the equipment and then called his supervisor to investigate. Approximately 200 liters of hydraulic oil was released to the adjacent ground surface, the surface consisting of broken waste rock (recent blast site). The immediate cause of the spill was a hose failure, which was subsequently replaced prior to equipment start-up.

Immediate and Follow-Up Action:

The Mine Operations Supervisor and Environment Department were notified immediately upon spill discovery. The immediate clean-up response was to use spill pads to mop up observed free product. The contaminated waste rock material was subsequently excavated. In consideration that the material was too coarse to place in the Milne Port Landfarm, it was hauled to the top of the PAG waste rock pile to be stored at a designated location for further observation and/or sampling. The storage area has drainage control and will be monitored for any free product migration or sheen. The nearest water body is >1 km away from both the spill location and storage location.

Recommendations:

Preventative maintenance inspection programs for the various components of the drill are being implemented.

Current Status:

The hose was subsequently replaced and the unit was put back into service. The affected area was cleaned up and the contaminated material placed in a secure, contained location..

Should you require further information or clarification on the above noted spill, please feel free to contact Jim Millard or Allan Knight at (647) 253-0596 x6016..

Prepared By

Jim Millard
Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Scot Klingsman, Sylvain Proulx, Bikash Paul, Allan Knight, Todd Burlingame, Stephane Houde (Baffinland),
Erik Allain, Scott Burgess (AANDC).

Photo 1 – Spill Location

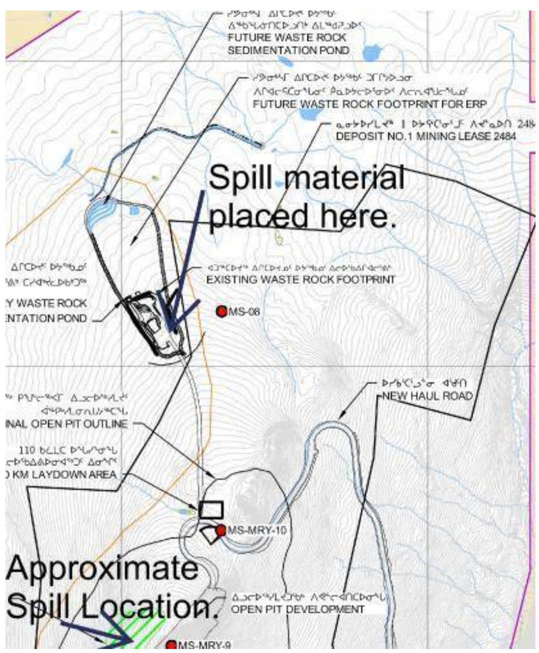

Figure 1 - Spill Location

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 07-17-2016	REPORT TIME 13:00 HRS	☒ ORIGINAL SPILL REPORT, OR	REPORT NUMBER
B	OCCURRENCE DATE: MONTH – DAY – YEAR 07-16-2016	OCCURRENCE TIME 17:00 HRS	☐ UPDATE # ___ TO THE ORIGINAL SPILL REPORT	16 - 264
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Project Mine Site, Baffin Island, NU	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 19 SECONDS 40	LONGITUDE DEGREES 79 MINUTES 13 SECONDS 23		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A		
H	PRODUCT SPILLED Hydraulic Oil	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES Approx. 200 L	U.N. NUMBER N/A	
H	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A	
I	SPILL SOURCE Hydraulic Oil Tank 390 Excavator	SPILL CAUSE Hose Failure	AREA OF CONTAMINATION IN SQUARE METRES Approx. 15 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY Coarse blasted waste rock	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A	

K — ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On July 16, 2016 at 16:00 HRS, the operator discovered that his CAT 390 excavator was leaking hydraulic oil at a high rate. The operator immediately shut down the equipment and then called his supervisor to investigate. Upon initial investigation it is estimated that 200 liters of hydraulic oil was released to the adjacent ground surface, the surface consisting of broken waste rock (recent blast site). The immediate clean-up response was to use spill pads to mop up observed free product. The immediate cause of the spill was a hose failure, which was subsequently replaced prior to equipment start-up. Contaminated waste rock was removed and hauled to the top of the PAG waste rock pile to be stored at a designated location for further observation and/or sampling. The storage area has drainage control and will be monitored for any free product migration or sheen. The nearest water body is >1 km away from both the spill location and storage location. This spill is being reported as required by the conditions of Type A Water Licence No. 2AM-MRY1325, Part H,item 9 (b).

L	REPORTED TO SPILL LINE BY Jim Millard	POSITION Env Manager	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE 647-253-0596
M	ANY ALTERNATE CONTACT Allan Knight	POSITION Env Superintendent	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Mary River	ALTERNATE TELEPHONE Ext 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 2 – NT-NU Spill Report

Baffinland

September 01, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
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Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Manager, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-283, Reported on August 3, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

On August 2, 2015 at 18:45 HRS, the 150 psi rated 6" flexible braided pipe supplying the P50 fuel module at Milne Port was observed to have failed, resulting in the release of diesel fuel into the fuel containment facility. The volume of released diesel fuel was approximately 155 cubic meters (m^3). Site Services personnel were able to shut off the valve upstream of the detached pipe within several minutes stopping the flow of fuel. Released fuel was contained within the engineered fuel containment liner and was not released to the environment. The location of the contained release is approximately 200 meters (m) south of the Milne Inlet. A response to the loss of control was initiated, and NT-NU Spill Report No. 16-283 was submitted on August 3, 2016.

Immediate and Follow-Up Action:

The damaged pipe was isolated by closing the upstream valve. The section of braided pipe was replaced and the fuel system piping system was inspected by a reliability engineer prior to being put back into service on August 10, 2016.

The incident investigation indicated the volume of diesel fuel released into the fuel containment facility was estimated to be approximately 155 m^3. Fuel recovery actions began August 11, 2016 involving the collection of approximately 130 m^3 of diesel and impacted water into temporary storage in double walled enviro tanks, poly totes and fuel bladders, which are all stored within the tank farm secondary containment. Approximately 280 m3 of impacted water has been removed and taken to the Milne Port Storm Water facility (MP-04) for treatment through the Oily Water Treatment System.

Recommendations:

Next Steps include:

- Transfer remaining impacted liquid from the bulk fuel tank containment berm to the oily water treatment system (OWS) containment area,
- Evaluate options to re-use the diesel fuel stored in the temporary storage tanks,
- Inspect and backfill the exposed section of liner with sand and washed, rounded granular material,
- Continue to monitor, analyze and treat water contained within the berm in accordance with the Type "A" Water Licence No. 2AM-MRY1235 Amendment No. 1, and
- Decommission the temporary storage tanks and bladders after the fuel and oily water is removed.

Current Status:

Water transfer, treatment and clean-up activities are on-going. Inspections of the engineered Bulk Fuel Containment Facility indicate liner integrity with no signs of product outside of the containment facility.

Should you require further information or clarification on the above noted spill, please feel free to contact Jim Millard or William Bowden at (647) 253-0596 x6016.

Prepared By:

William Bowden,

Environmental Coordinator

Reviewed by:

Wayne McPhee

Director Sustainable Development

Attach: Map, Photos, NT-NU Spill Report, NT-Nu Spill Report Update 1.

cc. Sylvain Proulx, Bikash Paul, Allan Knight, Todd Burlingame, Wayne McPhee Jim Millard (Baffinland), Stephen Bathory (QIA) Erik Allain, Scott Burgess (AANDC).

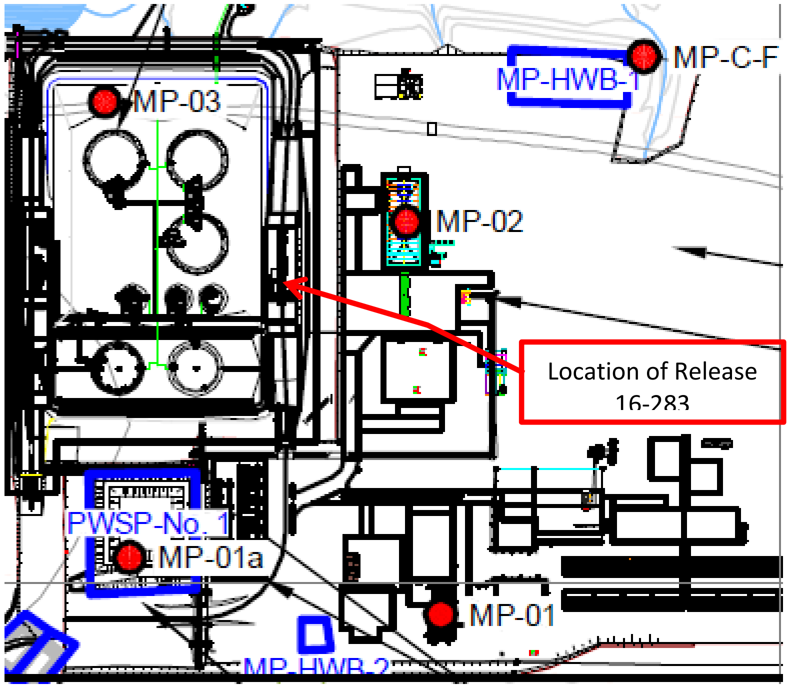

Figure 1: Location of spill.

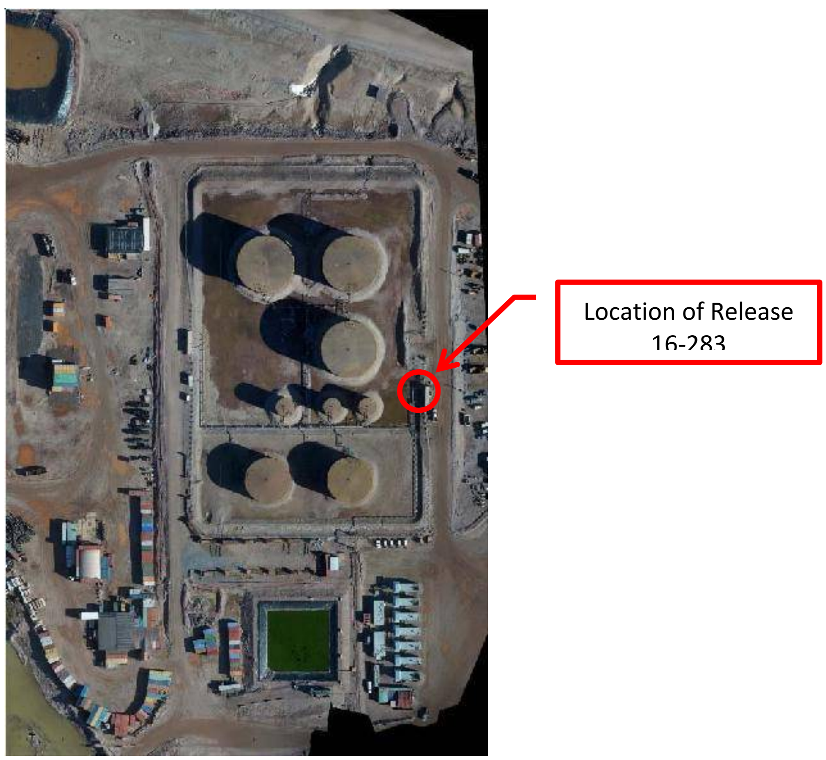

Figure 2: Aerial view of containment berm.

Photograph 1 – Braided Flex Pipe fuel supply line to back of Module

Photograph 2: Section of Braided Flex Pipe after replacement.

Photograph 3: Showing impacted water pooling within north and west side of interior containment berm.
August 8, 2016

Photograph 4: Showing north side of interior containment berm during collection activities.
August 31, 2016

Photograph 5: Showing west side of interior containment berm during collection activities.
August 31, 2016

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR August 3, 2016	REPORT TIME 12:00 HRS	X ORIGINAL SPILL REPORT, OR	REPORT NUMBER
B	OCCURRENCE DATE: MONTH – DAY – YEAR August 2, 2016	OCCURRENCE TIME 18:45 HRS	☐ UPDATE # ____ TO THE ORIGINAL SPILL REPORT	16 - 283
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Milne Port, Baffin Island, NU	REGION ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 53 SECONDS 08	LONGITUDE DEGREES 80 MINUTES 53 SECONDS 36		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A		
H	PRODUCT SPILLED P-50 Diesel	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES Unknown	U.N. NUMBER N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A	
I	SPILL SOURCE Milne Port Fuel Module	SPILL CAUSE Detached Pipe	AREA OF CONTAMINATION IN SQUARE METRES	
J	FACTORS AFFECTING SPILL OR RECOVERY N/A	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A	

K — ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At approximately 18:45, August 2, 2016, the 6" flex pipe supplying the P50 fuel module at Milne Port was observed to be detached resulting in a loss of control with fuel being released into the fuel containment facility. The volume of released fuel is unknown at this time. Site Services personnel were able to shut off the valve upstream of the detached pipe within several minutes stopping the flow of fuel. The Mine Rescue Team responded; fuel discharge from the 6" pipe was verified to be shut off. Released fuel is contained within the lined engineered fuel containment of the fuel farm and is not being released to the environment; hence, there is negligible risk to the adjacent land and waters. The location of the contained spill is approximately 200m from Milne Inlet. Methods for clean up will likely include skimming free phase product and treatment/storage of contaminated water. Further details regarding estimated volume and details pertaining to cause, recommendations, and clean-up will be provided in Spill Update / Follow-Up Spill Report.

L	REPORTED TO SPILL LINE BY Allan Knight	POSITION Env. Superintendent	EMPLOYER Baffinland	LOCATION CALLING FROM Mary River	TELEPHONE 647-253-0596
M	ANY ALTERNATE CONTACT Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION 902-403-1337	ALTERNATE TELEPHONE 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF ____

Attachment 1 – NT-NU Spill Report 16-283
August 3, 2016

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

Northwest Territories · Nunavut · Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: **August 8, 2016**	REPORT TIME: **12:00 HRS**	☐ ORIGINAL SPILL REPORT, OR ☒ UPDATE # **1** TO THE ORIGINAL SPILL REPORT	REPORT NUMBER: **16 - 283**
B	OCCURRENCE DATE: MONTH – DAY – YEAR: **August 2, 2016**	OCCURRENCE TIME: **18:45 HRS**		
C	LAND USE PERMIT NUMBER (IF APPLICABLE): **IOL - Commercial Lease: Q13C301**	WATER LICENCE NUMBER (IF APPLICABLE): **2AM-MRY1325 Type "A"**		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: **Mary River Milne Port, Baffin Island, NU**	REGION: ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES **71** MINUTES **53** SECONDS **08**	LONGITUDE: DEGREES **80** MINUTES **53** SECONDS **36**		
F	RESPONSIBLE PARTY OR VESSEL NAME: **Baffinland Iron Mines Corp.**	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: **2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3**		
G	ANY CONTRACTOR INVOLVED: **N/A**	CONTRACTOR ADDRESS OR OFFICE LOCATION: **N/A**		
H	PRODUCT SPILLED: **P-50 Diesel**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: **155 m3**	U.N. NUMBER: **N/A**	
H	SECOND PRODUCT SPILLED (IF APPLICABLE): **N/A**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: **N/A**	U.N. NUMBER: **N/A**	
I	SPILL SOURCE: **Milne Port Fuel Module**	SPILL CAUSE: **Detached Pipe**	AREA OF CONTAMINATION IN SQUARE METRES:	
J	FACTORS AFFECTING SPILL OR RECOVERY: **N/A**	DESCRIBE ANY ASSISTANCE REQUIRED: **N/A**	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: **N/A**	

K — ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

Based on the ongoing incident investigation, the volume released into the containment was estimated to be approximately 155 m3. This was based on two lines of information: the data available from tank fuel dips and the fuel management system (which records dispensing activities); and, on a survey of the area and depth of pooled fuel within the containment facility. The investigation into the incident is ongoing. A fuel recovery effort is being initiated. There has been no release to the receiving environment of fuel or fuel-impacted water from the fuel farm engineered containment based on daily monitoring along the outer toe of the facility and downstream.

L	REPORTED TO SPILL LINE BY: **Allan Knight**	POSITION: **Env. Superintendent**	EMPLOYER: **Baffinland**	LOCATION CALLING FROM: **Mary River**	TELEPHONE: **647-253-0596**
M	ANY ALTERNATE CONTACT: **Jim Millard**	POSITION: **Env. Manager**	EMPLOYER: **Baffinland**	ALTERNATE CONTACT LOCATION: **902-403-1337**	ALTERNATE TELEPHONE: **6016**

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC — SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN — FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF ______

Attachment 2 – NT-NU Spill Report 16-283 Update No. 1
August 8, 2016

Baffinland

September 26, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
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Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-315, Reported on August 27, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At 12:00 HRS on August 26, 2016, a grey water leak was reported originating from the MSC Kitchen lift station (LS19). The lift station only receives grey water from the kitchen and is not connected to any washrooms. The recoverable released grey water was sucked up using a vacuum truck and transferred to PWSP #1 at the Mine Site. Upon further investigation it was determined that the float control that actuates the lift station pumps had malfunctioned causing the lift station to overflow. Approximately 1.5 m^3 of grey water was released onto the adjacent ground, affecting an area of approximately 100 m^2. The location of the spill was on the Mine Site camp pad and is greater than 100 metres from the closest water body.

Immediate and Follow-Up Action:

Fixed Plant Maintenance and the Environment Department were immediately notified. The lift station pumps were manually activated and the vacuum truck was used to remove any pooling grey water.

Recommendations:

Routine inspections of the sewage lines and lift stations will continue to be completed to ensure all components of the sewage system are functioning as designed.

Current Status:

The float control for the lift station has been replaced and the lift station is back in service and functioning properly.

Should you require further information or clarification on the above noted spill, please feel free to contact Andrew Vermeer at (416) 364-8820 x6016 or Jim Millard at (902) 403-1337.

Prepared By:

Andrew Vermeer,
Environmental Coordinator

Reviewed by:

Jim Millard
Environmental Manager

Attach: Map, NT-NU Spill Report

cc. Todd Burlingame, Wayne McPhee, Sylvain Proulx, Bikash Paul, Jim Millard (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess (INAC)

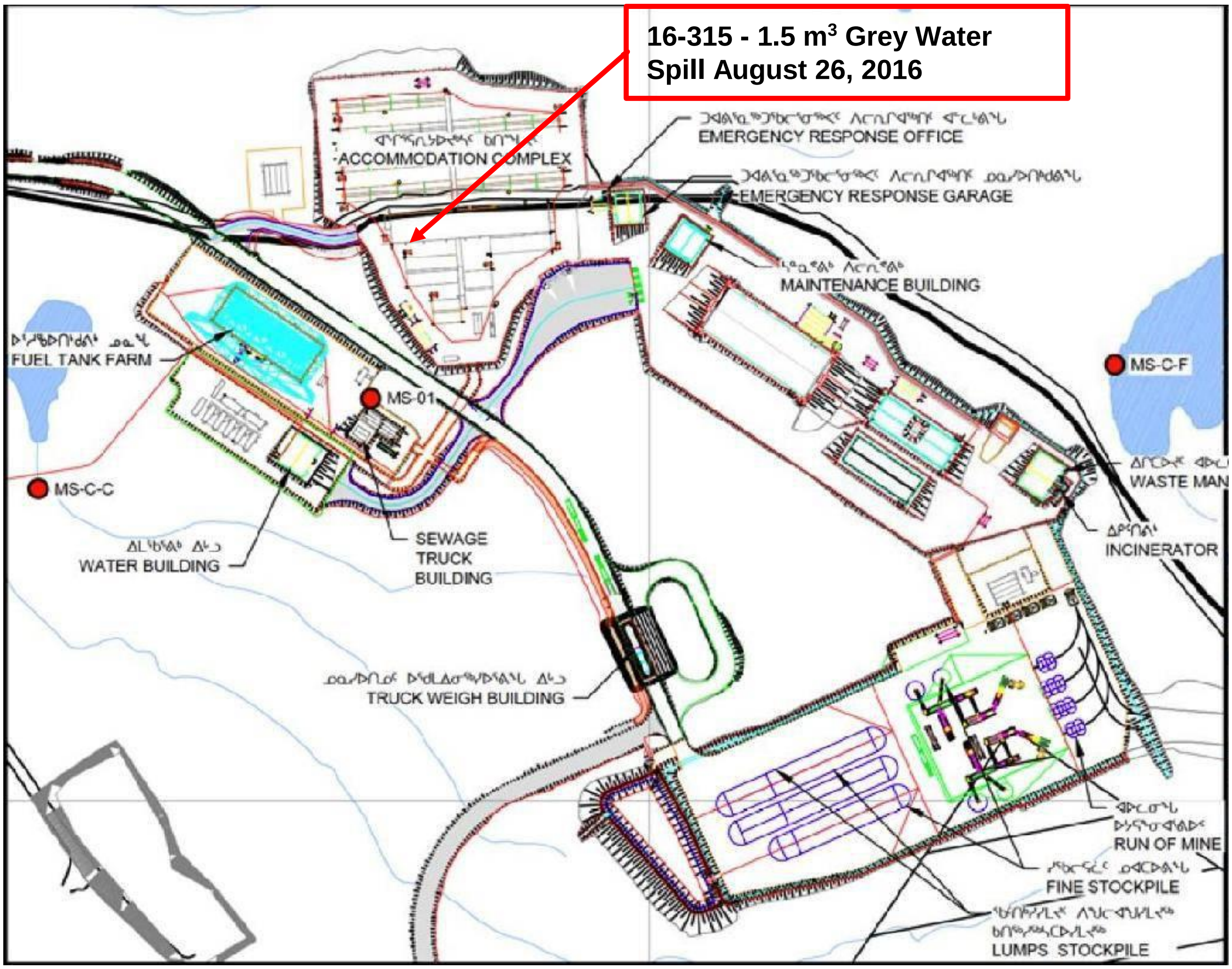

Figure 1 - Spill Location

Figure 2 – NT-NU Spill Report

Northwest Territories Nunavut Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 08-26-2016	REPORT TIME: 12:00 HRS	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # ____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER: 16 315
B	OCCURRENCE DATE: MONTH – DAY – YEAR: 06-26-2016	OCCURRENCE TIME: Unknown		
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Mine Site, Baffin Island, NU	REGION: ☐ NWT **X** NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 18 SECONDS 53	LONGITUDE: DEGREES 79 MINUTES 17 SECONDS 01		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Grey Water	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: 1.5 cubic meter	U.N. NUMBER: N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: Lift Station	SPILL CAUSE: Float/Pump Failure	AREA OF CONTAMINATION IN SQUARE METRES: 100 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY: Spill beside/below Infrastructure	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At 12:00 HRS on August 26, 2016, a grey water leak was reported originating from the MSC Kitchen South Lift Station 19. The Environment Department was notified upon discovery. This lift station only receives grey water from the kitchen. The recoverable released grey water was sucked up and disposed of in containment. Initial investigation determined the floats from the lift lift station failed to actuate the pumps causing the lift station to overflow. Approximately 1.5 m3 of grey water was released onto the adjacent ground, affecting an area of approximately 100 m2. The location of the spill was on the Mine Site camp pad, migrating underneath the office and ALS lab wings, and is greater than 100 metres from the closest water body. The investigation is currently ongoing and further details of the incident will be provided in the follow-up report. This spill is being reported as required by the conditions of water licence no. 2AM-MRY1325, Part H , item 9 (b) pursuant to subsection 12(3) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act.

L	REPORTED TO SPILL LINE BY: Allan Knight	POSITION: Env. Superintendent	EMPLOYER: Baffinland	LOCATION CALLING FROM: 647-253-0596	TELEPHONE: ext. 6016
M	ANY ALTERNATE CONTACT: Jim Millard	POSITION: Env. Manager	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: Off Site	ALTERNATE TELEPHONE: 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF ____

Baffinland

October 6, 2016

Resource Management Officer
Nunavut Field Operations
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Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-327, Reported on September 6, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At 0700 HRS on September 6, 2016, Baffinland's water treatment operator observed pooling wastewater inside and outside of the wastewater treatment plant (WWTP). The spill source was located in the backwash room from the aeration tank. Approximately 250 L of aerated sewage was released outside of the WWTP in a 40 m^2 area. Upon further investigation it was determined that a 2" diam. aluminum camlock fitting on the return line to recirculate aerated sewage failed and disconnected from the tank. Corrosion of the fitting may have contributed to the failure. The closest water body is approximately 100 m to the southwest and is currently frozen. The spill was confined to the WWTP pad.

Immediate and Follow-Up Action:

The WWTP operator immediately notified the Environment department and Site Services and a preliminary inspection was initiated. A vacuum truck was used to clean up pooling liquid inside of the WWTP. Sand was placed on the contaminated pad to absorb any remaining sewage. All contaminated material was transported to the land farm at Milne Port, an engineered lined containment facility. The corroded cam lock fitting was replaced with a new fitting before the system was put back into operation.

Recommendations:

Routine inspections of the WWTP will continue to be completed to ensure all components are functioning as designed.

Current Status:

The WWTP is currently fully operational and all lines and fittings appear to be in good condition.

Should you require further information or clarification on the above noted spill, please feel free to contact William Bowden at (416) 364-8820 x6016 or Jim Millard at (902) 403-1337.

Prepared By:

[redacted]

William Bowden,
Environmental Coordinator

Reviewed by:

[redacted]

Jim Millard
Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Todd Burlingame, Wayne McPhee, Sylvain Proulx, Sylvain Desrochers, Jim Millard Allan Knight (Baffinland),
Stephen Bathory (QIA), Erik Allain, Scott Burgess, Jonathan Mesher (INAC)

Photo 1. Spill contained to WWTP pad and vacuum truck used to suck up free liquid September 6th 2016.

Photo 2. Spill area after removal of contaminated material September 6th 2016.

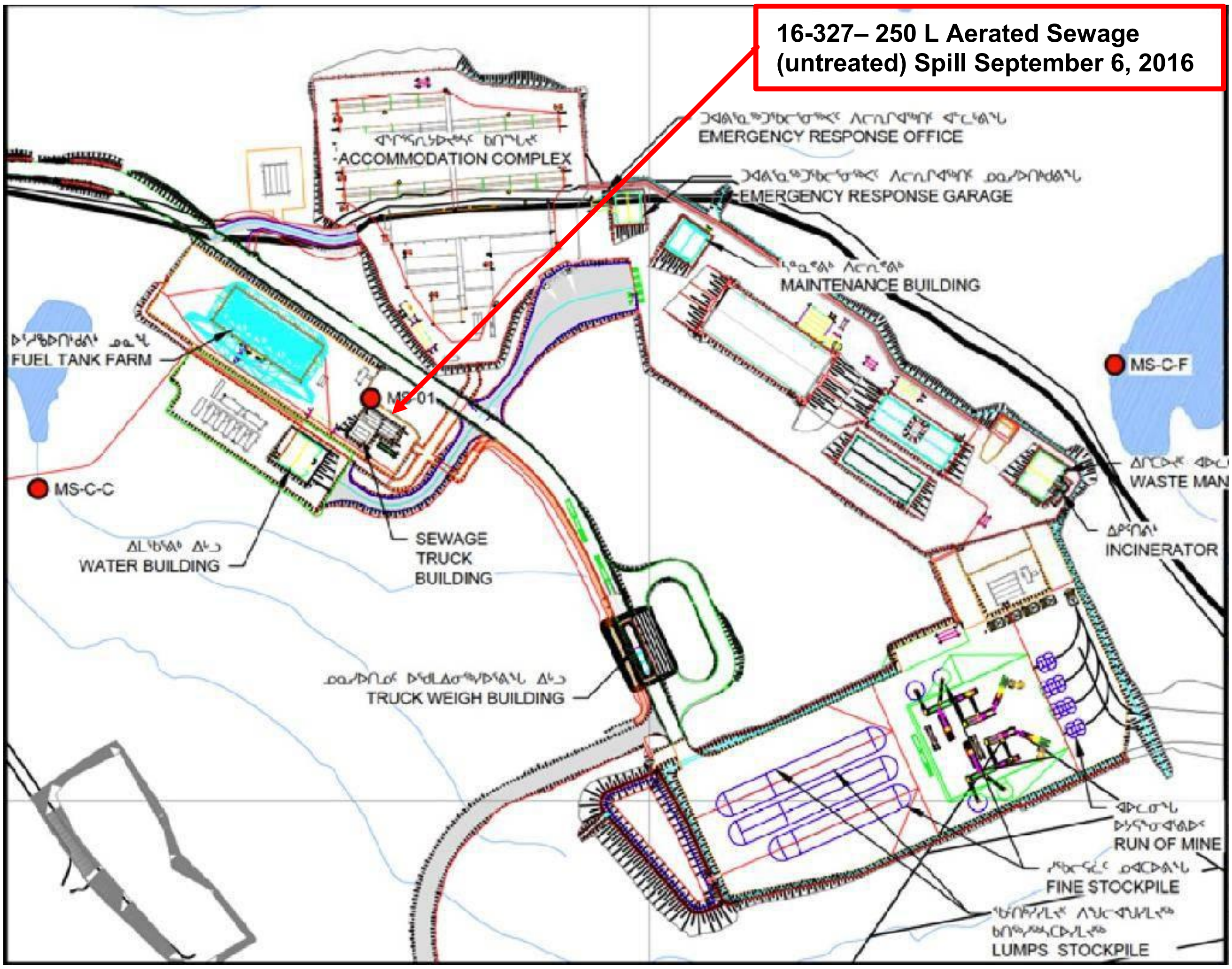


Figure 1 - Spill Location

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 09-06-2016	REPORT TIME 8:00 HRS	X ORIGINAL SPILL REPORT, OR ☐ UPDATE # ____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER 16 - 327
B	OCCURRENCE DATE: MONTH – DAY – YEAR 09-06-2016	OCCURRENCE TIME Unknown		
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Mine Site, Baffin Island, NU	REGION ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 18 SECONDS 53	LONGITUDE DEGREES 79 MINUTES 17 SECONDS 01		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A		
H	PRODUCT SPILLED Aerated sewage (unfiltered)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 250 L	U.N. NUMBER N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A	
I	SPILL SOURCE Membrane Bioreactor (MBR)	SPILL CAUSE Damaged fitting	AREA OF CONTAMINATION IN SQUARE METRES 40 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY Spill inside and beside MBR	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At 7:00 am Baffinland's water treatment operator observed pooling wastewater inside and outside of the MBR treatment building. The operator immediately notified the Environment department and Site Services and a preliminary inspection was initiated. The spill source was located in the backwash room from the aeration tank. Approximately 250 L of aerated sewage was released outside of the MBR in a 40 m2 area. The closest water body is approximately 100 m to the southwest; the spill was confined to the MBR pad. The contaminated material was transported to the landfarm, a engineered lined containment facility. A 2" diam. aluminum camlock fitting on the return line to recirculate aerated sewage appeared to fail and disconnect from the tank. The cause of the failure is not known but corrosion appears to be a factor. This spill is being reported as required by the conditions of water licence no. 2AM-MRY1325, Part H , item 9 (b) pursuant to subsection 12(3) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act.

L	REPORTED TO SPILL LINE BY Allan Knight	POSITION Env. Superintendent	EMPLOYER Baffinland	LOCATION CALLING FROM 647-253-0596	TELEPHONE ext. 6016
M	ANY ALTERNATE CONTACT Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Off Site	ALTERNATE TELEPHONE 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 2 – NT-NU Spill Report

Baffinland

October 11, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0
Justin Hack Justin.Hack@aandc-aadnc.gc.ca

Manager, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-338, Reported on September 12, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

On September 12, 2016 at 00:30 HRS, a loader operator discovered that the Sandvik Screen Plant, located within the Milne Port Ore Storage Pad, was leaking hydraulic oil. The operator immediately shut down the equipment and then called his supervisor to investigate. Approximately 200 litres of hydraulic oil was released to the adjacent ground surface on the Ore Storage Pad, an engineered contained area with ditches and a lined settling pond. Investigation determined the cause of the spill to be fitting failure, which was subsequently replaced prior to equipment start-up. The nearest natural water body is >100 m away from both the spill location and storage location and is currently frozen.

Immediate and Follow-Up Action:

The ship loader Supervisor and the Environment Department were notified immediately by the operator upon spill discovery. The immediate clean-up response utilised spill pads to mop up visible free product; the spill pads were placed in a Quatrex Bag. Contaminated ore was removed and placed in the NW corner of Ore Storage Pad.

Recommendations:

Ensure pre-op inspections are completed before use of the Sandvik Screen Plant.

The ditches and settling pond for the Milne Port Ore Storage Pad will be monitored for the presence of free phase product and sheen during the open water season.

Current Status:

The fitting was subsequently replaced and the screener is currently operational. The affected area was cleaned up and the contaminated material placed in a contained location.

Should you require further information or clarification on the above noted spill, please feel free to contact William Bowden or Jim Millard at (647) 253-0596 x6016 or (902) 403-1337.

Prepared By:

Connor Devereaux,

Environmental Coordinator

Reviewed by:

Jim Millard

Environmental Manager

Attach: Photos, Map, NT-NU Spill Report

cc. Anant Minhas, Sylvain Proulx, Sylvain Desrochers, Allan Knight, Jim Millard, Todd Burlingame, Wayne McPhee (Baffinland),
Erik Allain, Scott Burgess Jonathan Mesher (INAC).

Photo 1 – Hydraulic Oil Spill – 200 L

Photo 2– Spill Location after Cleanup

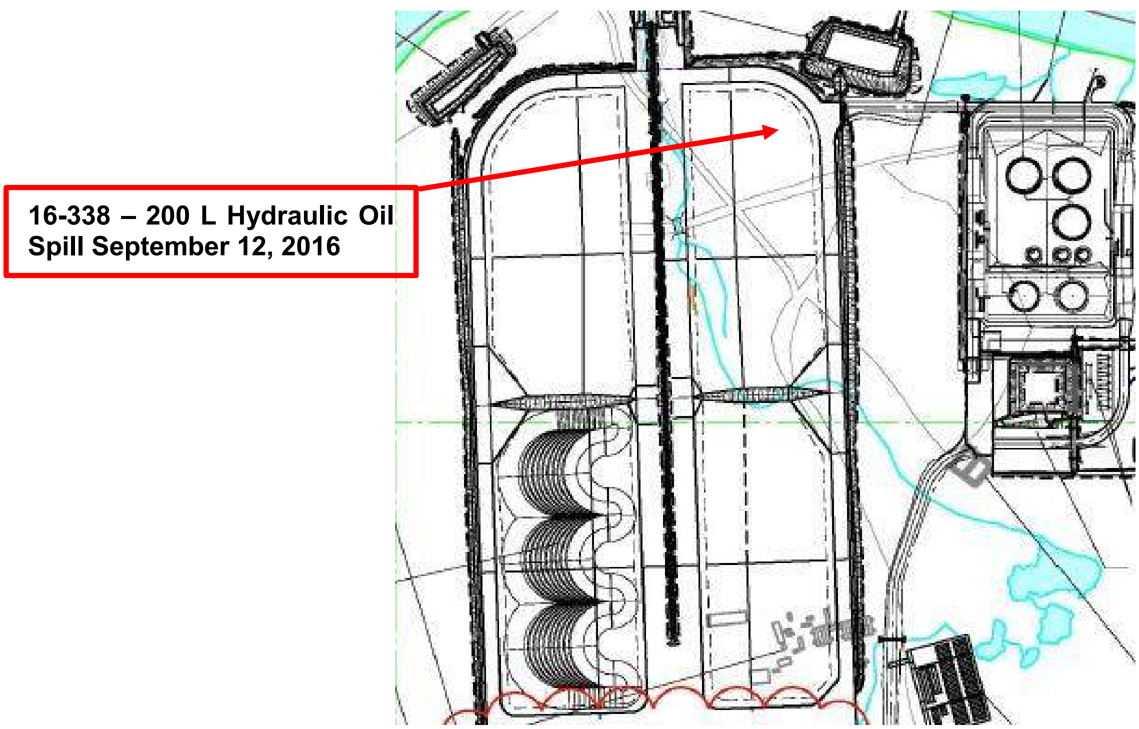


Figure 1 - Spill Location

NT-NU SPILL REPORT

Northwest Territories · Nunavut · Canada

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 09-12-2016	REPORT TIME: 17:00 HRS	☒ ORIGINAL SPILL REPORT, OR	REPORT NUMBER
B	OCCURRENCE DATE: MONTH – DAY – YEAR: 09-12-2016	OCCURRENCE TIME: 00:30 HRS	☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	16 - 338
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease No.: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Project Mine Site, Baffin Island, NU	REGION: ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 53 SECONDS 11	LONGITUDE: DEGREES 80 MINUTES 54 SECONDS 09		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Hydraulic Oil	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: Approx. 200 L	U.N. NUMBER: N/A	
H	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: Oil Tank Sandvik Screen Plant	SPILL CAUSE: Hose Fitting Failure	AREA OF CONTAMINATION IN SQUARE METRES: Approx. 9 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY: Lump Iron Ore, Ore Storage Pad	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On September 12, 2016 at 00:30 HRS, loader operator discovered that the Sandvik Screen Plant, located within the Milne Ore Storage Pad, was leaking hydraulic oil. The operator immediately shut down the equipment and then called his supervisor to investigate. Upon initial investigation it was estimated that 200 liters of hydraulic oil was released to the adjacent ground surface. The immediate clean-up response was to use spill pads to mop up observed free product and place in Quatrex bag. The immediate cause of the spill was a fitting failure, which was subsequently replaced prior to equipment start-up. Contaminated ore was removed and placed in the NW corner of Ore Storage Pad. The Ore Storage Pad is an engineered contained area with ditches and lined pond. The ditches and pond will be monitored for the presence of free phase product and sheen. The nearest natural water body is >100 m away from both the spill location and storage location. This spill is being reported as required by the conditions of Type A Water Licence No. 2AM-MRY1325, Part H,item 9 (b).

L	REPORTED TO SPILL LINE BY: Jim Millard	POSITION: Env Manager	EMPLOYER: Baffinland	LOCATION CALLING FROM: Mary River	TELEPHONE: 647-253-0596
M	ANY ALTERNATE CONTACT: William Bowden	POSITION: Env Supervisor	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: Mary River	ALTERNATE TELEPHONE: Ext 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Figure 2 – NT-NU Spill Report

November 8, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0
Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-374, Reported on October 9, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At 08:00 HRS on October 9, 2016, Environment personnel, on a routine inspection, discovered an overflow originating from the Mine Site accommodation complex kitchen south lift station 19. This lift station only receives grey water from the kitchen. Recoverable released grey water was vacuumed and disposed of in containment. Upon the initial investigation it was determined the float from the lift station failed to actuate the pumps causing the lift station to overflow. Approximately 1 m^3 of grey water was released onto the adjacent ground, affecting an area of approximately 75 m^2.

The volume of the spill was contained on the Mine Site camp pad, migrating underneath the office wing, this area is greater than 100 metres from the closest water body which is currently frozen.

Immediate and Follow-Up Action:

Baffinland Fixed Plant Maintenance was immediately notified of the release. The vacuum truck was used to draw down the grey water level in the lift station, preventing further overflow and collect recoverable greywater that was released. The pumps were shut-off and the float was replaced.

Recommendations:

Routine inspections of the sewage lines, lift stations and pump floats will continue to be completed to ensure all components of the sewage system are functioning as designed.

Current Status:

The lift station pump float was repaired shortly after the spill was reported and the lift station was placed back into service after it was determined that the float was functioning properly.

Should you require further information or clarification on the above noted spill, please feel free to contact Bill Bowden at (647) 253-0596 x6016 or Jim Millard at (902) 403-1337.

Prepared By:

Lea Willemse

Environmental Coordinator

Reviewed by:

Jim Millard
Environmental Manager

Attach: Map, NT-NU Spill Report

cc. Todd Burlingame, Wayne McPhee, Sylvain Proulx, Robert Gagne, Jim Millard (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess, Sarah Forte (INAC).

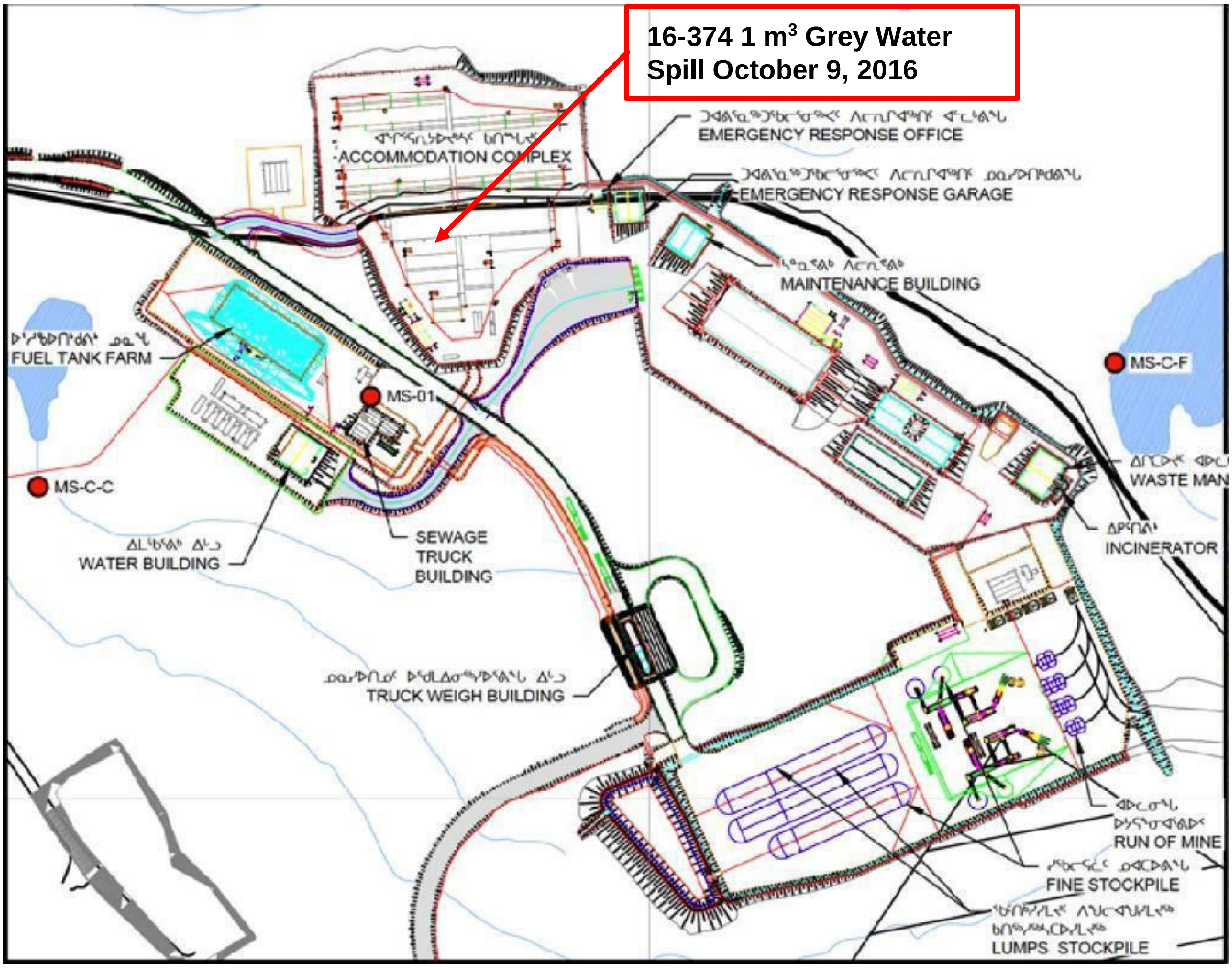


Figure 1 - Spill Location

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 10-09-2016	REPORT TIME 8:00 HRS	X ORIGINAL SPILL REPORT, OR	REPORT NUMBER 16 374
B	OCCURRENCE DATE: MONTH – DAY – YEAR 10-09-2016	OCCURRENCE TIME Unknown	☐ UPDATE # TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Mine Site, Baffin Island, NU	REGION ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 18 SECONDS 52	LONGITUDE DEGREES 79 MINUTES 17 SECONDS 01		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A		
H	PRODUCT SPILLED Grey Water	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 1.0 cubic meter	U.N. NUMBER N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A	
I	SPILL SOURCE Lift Station	SPILL CAUSE float/pump failure	AREA OF CONTAMINATION IN SQUARE METRES 75 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY Spill beside/below Infrastructure	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At 08:00 HRS on October 9, 2016, Environment personal, on inspection, discovered an overflow originating from the MSC Kitchen South Lift Station 19. This lift station only receives grey water from the kitchen. The recoverable released grey water was sucked up and disposed of in containment. Initial investigation determined the float from the lift station failed to actuate the pumps causing the lift station to overflow. Approximately 1 m3 of grey water was released onto the adjacent ground, affecting an area of approximately 75 m2. The location of the spill was on the Mine Site camp pad, migrating underneath the office wing, and is greater than 100 metres from the closest water body which is currently frozen. The investigation is currently ongoing and further details of the incident will be provided in the follow-up report. This spill is being reported as required by the conditions of water licence no. 2AM-MRY1325, Part H , item 9 (b) pursuant to subsection 12(3) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act.

L	REPORTED TO SPILL LINE BY William Bowden	POSITION Env. Coordinator	EMPLOYER Baffinland	LOCATION CALLING FROM 647-253-0596	TELEPHONE ext. 6016
M	ANY ALTERNATE CONTACT Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Off Site	ALTERNATE TELEPHONE 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Figure 2 – NT-NU Spill Report

Baffinland

November 9, 2016

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0
Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-377, Reported on October 13, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At approximately 12:00 on October 12, 2016, Mine Site Services personal discovered a tank overflow originating from the AD Wing of the Mine Site accommodations complex. This lift station is a temporary station/tank that is in use while the original lift station is undergoing repairs. There is no level alarm on this temporary tank and it requires manual pumping. It appeared as though the pumping of this tank was overlooked during shift change. Approximately 300 L was released onto the adjacent ground surface covering an area of snow -covered ground of approximately 20 m^2.

The released sewage was contained on the Mine Site camp pad and is greater than 100 m from the closest water body which is currently frozen.

Immediate and Follow-Up Action:

Baffinland Fixed Plant Maintenance and Environment Department were immediately notified of the release. The vacuum truck was used to draw down the sewage level in the lift station, preventing further overflow. The contaminated snow-cover was excavated and transported for proper disposal.

Recommendations:

Additional monitoring of this lift station, in addition to daily pumping is being completed to prevent further overflows.

Current Status:

Until repairs to the permanent lift station are complete and placed back into commission, the temporary lift station will remain in use. As per the recommendation provided, monitoring of sewage levels and daily pumping will be completed.

Should you require further information or clarification on the above noted spill, please feel free to contact Bill Bowden / Jim Millard at (647) 253-0596 x6016 or Jim Millard at (902) 403-1337.

Prepared By:

Lea Willemse
Lea Willemse
Environmental Coordinator

Reviewed by:

Jim Millard
Environmental Manager

Attach: Map, NT-NU Spill Report

cc. Todd Burlingame, Wayne McPhee, Sylvain Proulx, Robert Gagne, Jim Millard (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess, Sarah Forte (INAC).

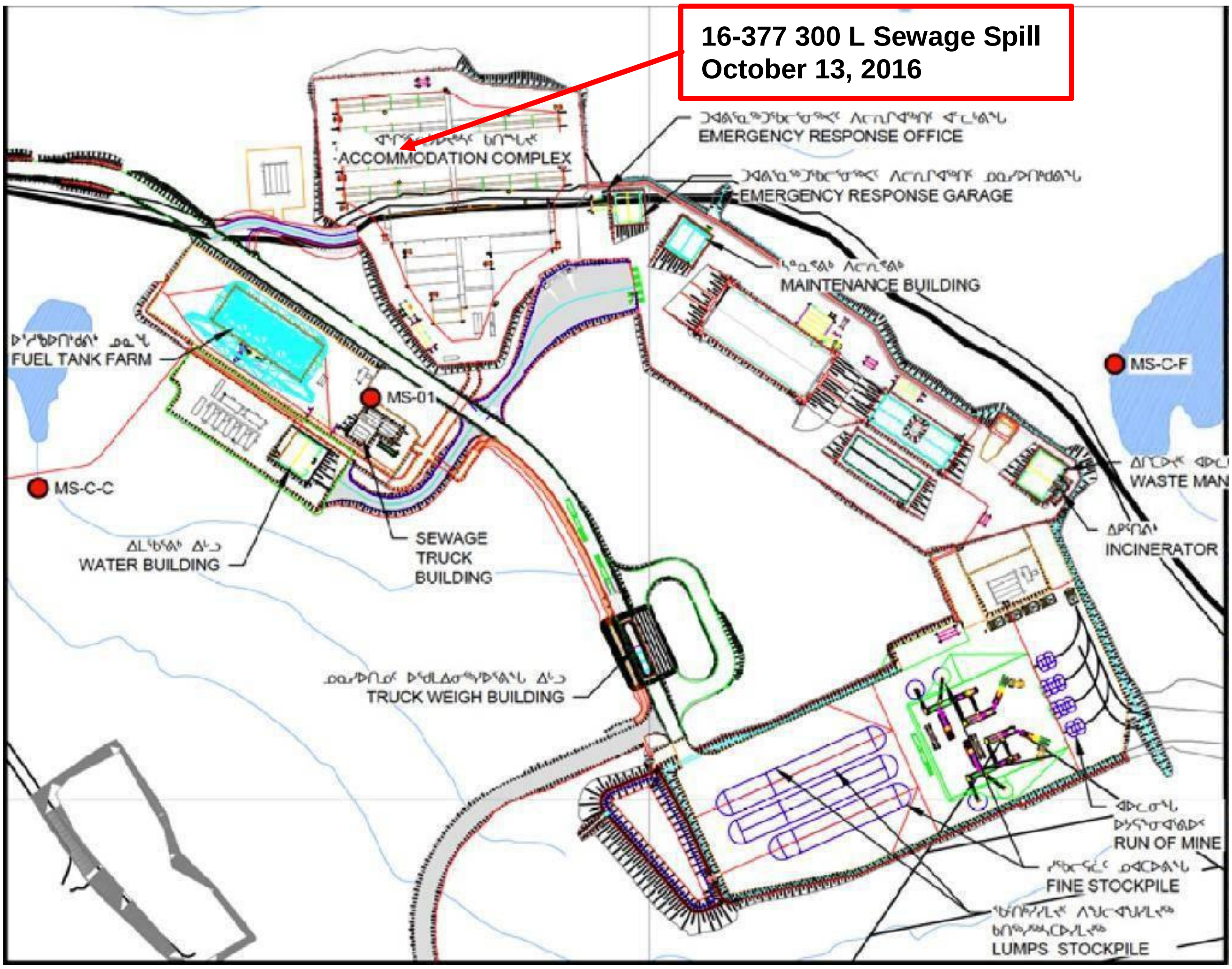


Figure 1 - Spill Location

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 10-13-2016	REPORT TIME: 1200 HRS	X ORIGINAL SPILL REPORT, OR	REPORT NUMBER: 16 377
B	OCCURRENCE DATE: MONTH – DAY – YEAR: 10-12-2016	OCCURRENCE TIME: Unknown	☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Mine Site, Baffin Island, NU	REGION: ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 18 SECONDS 55	LONGITUDE: DEGREES 79 MINUTES 17 SECONDS 04		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Sewage	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: 300 L	U.N. NUMBER: N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: Lift Station	SPILL CAUSE: Overflow	AREA OF CONTAMINATION IN SQUARE METRES: 20 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY: Spill beside/below Infrastructure	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

Around noon time on October 12, 2016, Site Services personal discovered a tank overflow originating from the AD Wing of the Mine Site Complex. This lift station is a temporary station/tank that is in use while the original lift station is undergoing repairs. There is no level alarm on this temporary tank and it is manually pumped. It appeared as though the pumping of this tank was overlooked during shift change. Approximately 300 L was released onto the adjacent ground surface covering an area of around 20 m2. . The sewage soaked into the snow, and the snow will be excavated and properly disposed of when resources are available. The location of the spill was on the Mine Site camp pad and is greater than 100 m from the closest water body which is currently frozen. More frequent monitoring of the sewage level in this tank will be completed while the repair is completed. A follow-up report with recommendations will be completed within 30 days. This spill is being reported as required by the conditions of Water Licence no. 2AM-MRY1325, Part H , item 9 (b).

L	REPORTED TO SPILL LINE BY: William Bowden	POSITION: Env. Coordinator	EMPLOYER: Baffinland	LOCATION CALLING FROM: 647-253-0596	TELEPHONE: ext. 6016
M	ANY ALTERNATE CONTACT: Jim Millard	POSITION: Env. Manager	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: Off Site	ALTERNATE TELEPHONE: 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Figure 2 – NT-NU Spill Report

December 13, 2016

Resource Management Officer Nunavut Field Operations Aboriginal Affairs and Northern Development Canada Box 100 Iqaluit, NU X0A 0H0 Justin.Hack@aandc-aadnc.gc.ca	Director, Major Projects Qikiqtani Inuit Association P.O. Box 219 Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-403, Reported on November 15, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At 08:00 HRS on November 14, 2016, a worker conducting a routine inspection discovered that the south lift station servicing the mine site complex kitchen had overflowed. This lift station only receives grey water from the kitchen. Approximately 500 L of grey water was released onto the adjacent ground, affecting an area of approximately 5 m^2. Upon investigation, it was determined the lift station floats failed to activate the lift station pumps, resulting in the overflow.

The location of the spill was on the Mine Site camp pad and is greater than 100 metres from the closest water body which is currently frozen.

Immediate and Follow-Up Action:

Baffinland Fixed Plant Maintenance was immediately notified of the release. The lift station pumps were activated manually to draw down water levels in the lift station and prevent further overflow.

Recommendations:

Routine inspections of the sewage lines, lift stations and pump floats will continue to be completed to ensure all components of the sewage system are functioning as designed.

Current Status:

The lift station floats have been replaced with a new type of float. The lift station is back in service with all components functioning as designed.

Should you require further information or clarification on the above noted spill, please feel free to contact Andrew Vermeer at (647) 253-0596 x6039 or Jim Millard at (902) 403-1337.

Prepared By:	Reviewed by:
Andrew Vermeer Environmental Coordinator	Jim Millard Environmental Manager

Attach: Map, NT-NU Spill Report

cc. Todd Burlingame, Wayne McPhee, Sylvain Proulx, Robert Gagne, Jim Millard (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess, Sarah Forte (INAC).

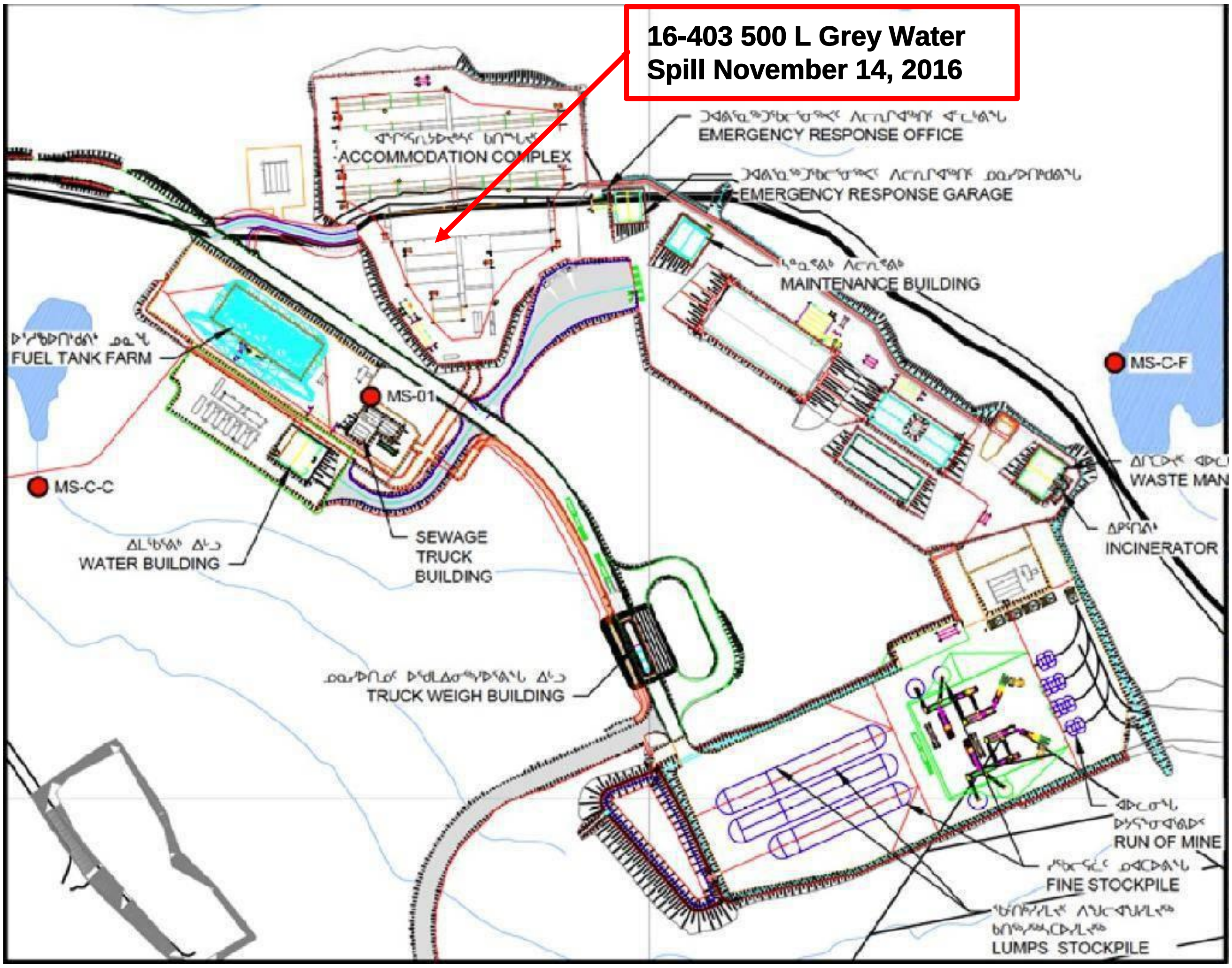


Figure 1 - Spill Location

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 11-14-2016	REPORT TIME: 8:00 HRS	X ORIGINAL SPILL REPORT, OR ☐ UPDATE # ___ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER: 16 403
B	OCCURRENCE DATE: MONTH – DAY – YEAR: 11-14-2016	OCCURRENCE TIME: Unknown		
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Mine Site, Baffin Island, NU	REGION: ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 18 SECONDS 52	LONGITUDE: DEGREES 79 MINUTES 17 SECONDS 01		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Grey Water	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: 500 L	U.N. NUMBER: N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: Lift Station	SPILL CAUSE: Pump Malfunction	AREA OF CONTAMINATION IN SQUARE METRES: 5 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY: Spill beside/below Infrastructure	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: N/A	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At 08:00 HRS on November 14, 2016, a worker, while conducting a routine inspection, discovered that the south lift station servicing the MSC Kitchen had overflowed. This lift station only receives grey water from the kitchen. Approximately 500 L of grey water was released onto the adjacent ground, affecting an area of approximately 5 m2. The location of the spill was on the Mine Site camp pad and is greater than 100 metres from the closest water body which is currently frozen. Accessible contaminated snow and ice will be removed and transported to Mine Site PWSP #1. The initial investigation determined the the lift station pumps did not activate causing the lift station to overflow however the root cause of the overflow is currently being investigated. Further details of the incident will be provided in the follow-up report. This spill is being reported as required by the conditions of Water Licence No. 2AM-MRY1325, Part H , item 9 (b) pursuant to subsection 12(3) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act.

L	REPORTED TO SPILL LINE BY: Andrew Vermeer	POSITION: Env. Coordinator	EMPLOYER: Baffinland	LOCATION CALLING FROM: MR Mine Site	TELEPHONE: Ext. 6039
M	ANY ALTERNATE CONTACT: Jim Millard	POSITION: Env. Manager	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: MR Mine Site	ALTERNATE TELEPHONE: Ext. 6016

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 2 – NT-NU Spill Report

Baffinland

January 2, 2017

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0
Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-414, Reported on December 3, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At 02:00 HRS on December 3, 2016 while clearing the area in preparation to remove the former seacan bridge crossing (CV217B) located at the Tote Road km 80 bridge, an excavator (EXC003) broke through the ice layer covering the water body (river outlet from Muriel Lake) submerging the EXC003 by approximately 75%. CV217B is evaluated as fish habitat, although during the fall/winter season, fish are likely not present due to shallow overwintering conditions. At the time of the incident, the freshly exposed water surrounding the submerged machine was observed for signs of a release of fuel and/or lubricating oils. No release was observed at the time of the incident. Monitoring of this area for evidence of a spill was ongoing until the safe and successful extraction of the excavator from the ice/water body. On December 6, an update to spill report 16-414 was submitted after 1 litre of lubricating oil was released to the top layer of the ice at the EXC003's location; this was promptly recovered and cleaned up. The removal of the seacan bridges are a requirement of Baffinland's Tote Road DFO authorization and at the time of the incident, the excavator was engaged in preparing the site for this reclamation activity.

The original Spill Report 16-414 (December 3) and Update No. 1 (December 6) were submitted to the NT-NU Spill Line and other applicable stakeholders. These reports including location plan are presented in Attachment A.

Photos of the incident and follow-up actions are provided in Attachment B.

Immediate and Follow-Up Action:

The planning process for the extraction of EXC003 from the CV217B crossing was initiated immediately following the incident. To minimize the risks to worker safety and the environment, it was determined that extraction activities would be completed in the following two phases: recovery of fuel, hydraulic and glycol from EXC003 compartments, followed by the extraction of EXC003 from the ice/water body.

On December 5 and 6, 2016, accessible oil (~25L), diesel (~500L), and glycol (~25L) were recovered from EXC003 compartments. At that time it was observed that lubricating oil was released to the adjacent ice on one side of the excavator cab. Approximately one (1) litre of product was found in two pockets on the surface of the ice, covering an area of approximately 0.25 m^2. The released product and contaminated ice were recovered for proper disposal. Spill response supplies were proactively stockpiled at the location to mitigate any further incident.

A water sample was collected at a location downstream of the submerged EXC003 on December 9 by drilling holes through the ice with an auger. Laboratory results were below analytical detection limits for BTEX, PHC and TOG (refer to Attachment C). At that time a number of holes were augured through the ice downstream of the equipment to detect any stream flows utilizing a flow meter through the augured holes. The water column was minimal and there were no measureable flows, indicating that the incident location was in an isolated and discontinuous pocket of water.

On December 16, 2016, EXC003 was successfully extracted from the CV217B crossing without further incident to worker safety or the environment. The extraction planning process involved careful consideration to minimize potential risks to personnel, equipment and to reduce the risk of the release of any residual hydrocarbons or glycol.

The extraction process was undertaken in the following steps:

- Construction of a ramp to the bank location using clean rip rap and careful breaking of ice near and adjacent to the excavator.
- Probing around the excavator to determine the position of the tracks. Ensured the tracks were oriented in the appropriate direction to approach and pull the excavator from its submerged location.
- An underwater camera was used to locate towing points that could be utilized by heavy equipment to securely extract the excavator.
- Multiple auger holes, were drilled on the ice to measure ice thickness and water column depth in the work area where heavy equipment or personnel would be operating. No hydrocarbons were detected in the adjacent water based on visual or olfactory observations.
- Trash pumps were used to lower the surrounding water level in the non-frozen pocket of the river where the excavator broke through. Rigging was attached to the exposed anchor points and the submerged excavator was slowly removed from the water using heavy equipment.

Following the successful extraction of the excavator from the water body, a second water sample was collected on December 17, 2016, at the location of the submerged EXC003, in the standing pocket of water. Laboratory results were below analytical detection limits for BTEX, PHC, TOG, and glycols (refer to Attachment C).

Basic Cause and Recommendations:

It has been recognized, that the Job Hazard Analysis formulated for the removal of the Tote Road seacan bridge crossings did not account for differences in ice thickness between the three seacan bridge locations scheduled to be removed, nor did it account for timing of removal. The seacan bridges located at km 62 (BG-50A) and km 97 (CV-223) on the Tote Road were safely removed without incident, and were both situated in shallow water (<0.5 m depth) frozen to the bottom. There was an expectation that the water depth at CV217B, would be minimal as well (<1m depth); this was not the case.

In addition, the proper procedure for working on or near ice covered water bodies was not effectively communicated to the seacan bridge removal team and operator performing the removal of CV217B. Operator assumptions may have contributed to the incident. (The operator involved had participated in the original installation of the seacan bridge crossings on the Tote Road in 2007.) An existing working on ice procedure did exist at the time of the incident however this procedure was not formally processed through document control for distribution to all departments.

Recommendations, derived from the incident investigation, developed for implementation into Baffinland's safe operating procedures include the following:

- Prior to completing all future on-ice work, a temporal and geographically site specific JHA will be completed,
- Prior to completing all future on-ice work, augured holes must be drilled to determine ice thickness, this instruction needs to be clearly communicated to all equipment operators working near or on water no matter what the estimated depth of the water column;
- Development of a formal document controlled "working on-ice" procedure to address requirement for ice-thickness measurements to determine suitability for various work activities (personnel and/or equipment), no matter what the assumed ice thickness; and
- Prior to completing all on-ice work, all personnel must be trained in the working-on ice procedure and be aware of risks of the prescribed job and their responsibilities.

Current Status:

Throughout extraction activities, the presence of hydrocarbons were not detected in the open water by visual or olfactory observations; however, confirmatory water samples were collected during two events; at a location 30 m downstream of the submerged excavator on December 9, 2016; and at the location of the submerged excavator on December 17, 2016. Laboratory results for both samples (refer to Attachment C) identify non-detect for BTEX, PHC, TOG, and glycols supporting that there was little to no hydrocarbon or glycol release to the water column from the partial submersion of EXC003.

The disturbed areas of the riverbank have been stabilized with 6" clean riprap to prevent subsequent erosion. Slope stability of the impacted area will be monitored during freshet and if required, additional sedimentation controls will be applied at that time.

After being extracted from the river, EXC 003 is parked near the Km 80 bridge, currently tarped being thawed out on a Tote Road push out greater than 31m from the closest water body. A downstream berm is erected directly below it (as a contingency measure).

The formal document controlled version of a Working On Ice Procedure and associated training is in development.

Should you require further information or clarification on the above noted spill, please feel free to contact William Bowden at (647) 253-0596 x6016 or Jim Millard at (902) 403-1337.

Prepared By:

William Bowden
Environmental Superintendent

Reviewed by:

Jim Millard
Environmental Manager

Attach: A – NT-NU Spill Reports,
B - Photos,
C – Analytical Water Quality Results from ALS Laboratories

cc. Todd Burlingame, Wayne McPhee, Sylvain Proulx, Robert Gagne, Jim Millard Allan Knight (Baffinland), Stephen Bathory (QIA), Erik Allain, Scott Burgess, Sarah Forte, Jonathan Mesher (INAC).

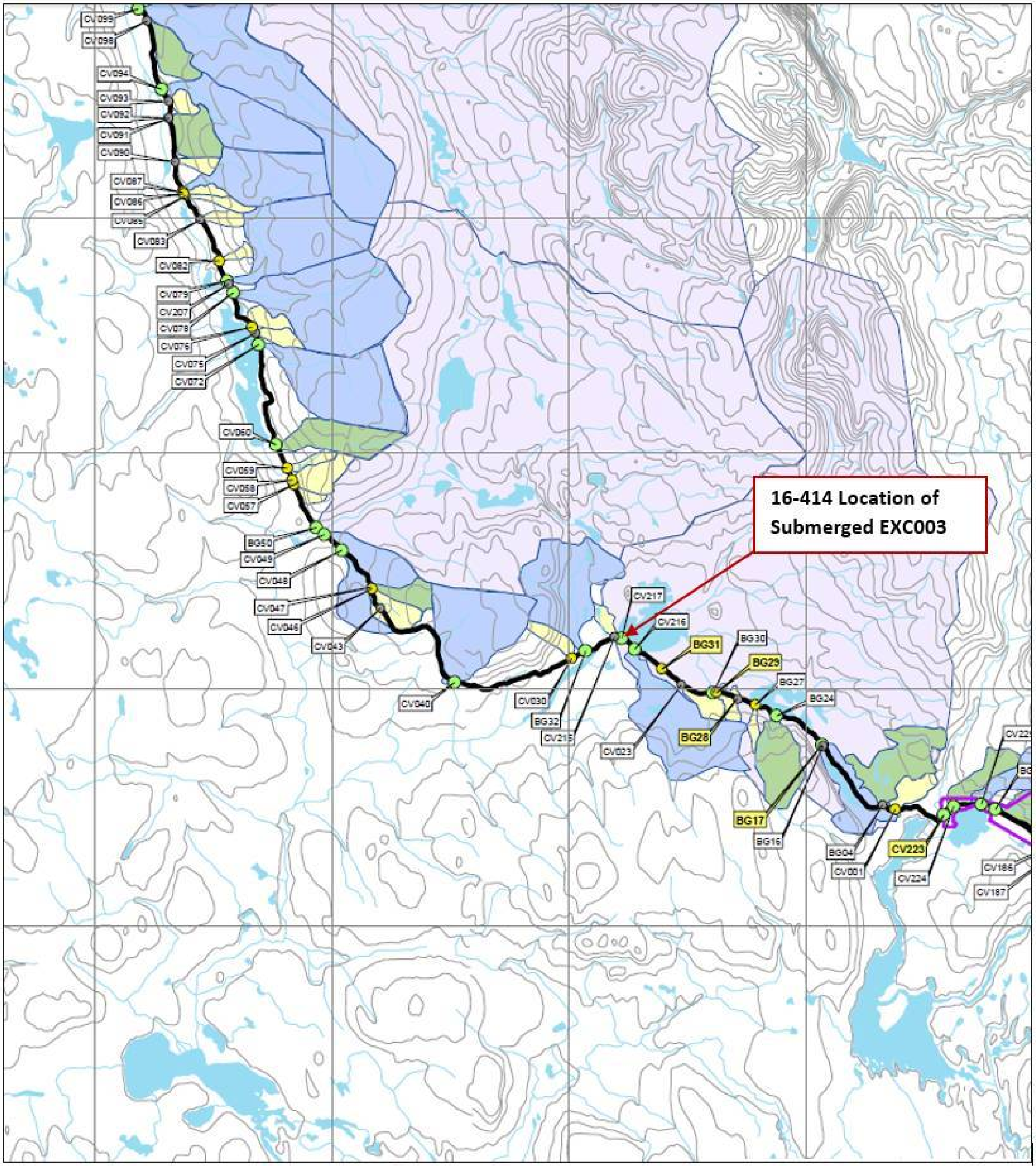


Figure 1 – Location Map

Baffinland

ATTACHMENT A

NT- NU Spill Reports

Baffinland

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 12-03-2016	REPORT TIME: 02:00 HRS	X ORIGINAL SPILL REPORT, OR ☐ UPDATE # TO THE ORIGINAL SPILL REPORT	REPORT NUMBER: 16 - 414
B	OCCURRENCE DATE: MONTH – DAY – YEAR: 12-03-2016	OCCURRENCE TIME: 17:00 HRS		
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Mine Site, Baffin Island, NU	REGION: ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 88 SECONDS 46	LONGITUDE: DEGREES 80 MINUTES 88 SECONDS 59		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Potential for fuel/oil/grease	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: TBD (Potential)	U.N. NUMBER: N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: Potential from fuel/oil tank/grease	SPILL CAUSE: Partial submersion in river	AREA OF CONTAMINATION IN SQUARE METRES: N/A	
J	FACTORS AFFECTING SPILL OR RECOVERY: River ice cover	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: N/A	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS: At 02:00 HRS on December 3, 2016 while clearing the area in preparation to remove the former seacan bridge crossing (CV217) located at Tote Road km 80 bridge, an excavator broke through the ice layer covering the water body (river outlet from Muriel Lake)submerging the excavator by approximately 75%. The river at this location is considered to be fish habitat, although during the fall/winter season, fish are not thought to be present due to shallow overwintering conditions. At the time of the incident, the freshly exposed water surrounding the submerged machine was observed for signs of a release of fuel and/or lubricating oils. No release was was observed at this time. Monitoring of this area for evidence of a spill will continue until the safe and successful extraction of the excavator from the ice/water body. If, during ongoing monitoring, there is evidence of a spill, an update to this spill report will be submitted. Additional incident details and results of investigation will be provided in the follow-up report to be submitted within 30 days.			

L	REPORTED TO SPILL LINE BY: Bill Bowden	POSITION: Env. Coordinator	EMPLOYER: Baffinland	LOCATION CALLING FROM: MR Mine Site	TELEPHONE: Ext. 6016
M	ANY ALTERNATE CONTACT: Jim Millard	POSITION: Env. Manager	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: Off-site	ALTERNATE TELEPHONE: 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 2 – NT-NU Spill Report

Baffinland

Northwest Territories · Nunavut · Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 12-06-2016	REPORT TIME: 22:00 HRS	☐ ORIGINAL SPILL REPORT, OR X UPDATE # 1 TO THE ORIGINAL SPILL REPORT	REPORT NUMBER: 16 - 414
B	OCCURRENCE DATE: MONTH – DAY – YEAR: 12-03-2016	OCCURRENCE TIME: 17:00 HRS		
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Mine Site, Baffin Island, NU	REGION: ☐ NWT X NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 88 SECONDS 46	LONGITUDE: DEGREES 80 MINUTES 88 SECONDS 59		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Lubricating oil	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: Approx. 1 Litre	U.N. NUMBER: N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: unknown	SPILL CAUSE: Partial submersion in river	AREA OF CONTAMINATION IN SQUARE METRES: 0.25	
J	FACTORS AFFECTING SPILL OR RECOVERY: River ice cover	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: Working on ice	

K ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

Upon further monitoring of the excavator that broke through the ice on December 3, 2016, located at the former km 80 seacan bridge crossing (CV217), it was identified on December 5, 2016, that lubricating oil was released to the adjacent ice on one side of the excavator cab. The released product resembles unused hydraulic and/or unused engine oil. The specific source location from the excavator is unknown at this time. Approximately one (1) litre of product was found in two pockets on the surface of the ice, covering an area of approximately 0.25 m2. The released product and contaminated ice was recovered for proper disposal. While the spill response team was on the ice, the excavator's diesel, hydraulic oil and coolant tanks were safely evacuated of accessible product, removed from the scene, and securely stored. Currently there is no other evidence of sheen or further release of product from the excavator. Further spill report updates will be provided in the event there is evidence for additional product release.

L	REPORTED TO SPILL LINE BY: Bill Bowden	POSITION: Env. Coordinator	EMPLOYER: Baffinland	LOCATION CALLING FROM: MR Mine Site	TELEPHONE: Ext. 6016
M	ANY ALTERNATE CONTACT: Jim Millard	POSITION: Env. Manager	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: Off-site	ALTERNATE TELEPHONE: 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION: STATION OPERATOR	EMPLOYER	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 3 – NT-NU Spill Report - Update No. 1

ATTACHMENT B

PHOTOS OF SPILL

Baffinland

Photo 1 – Submerged EXC003

Photo 2 – Diesel Fuel Recovery

2275 Upper Middle Road East, Suite 300 | Oakville ON, Canada L6H 0C3 | Main: 416.364.8820 | Fax: 416.364.0193 | www.baffinland.com

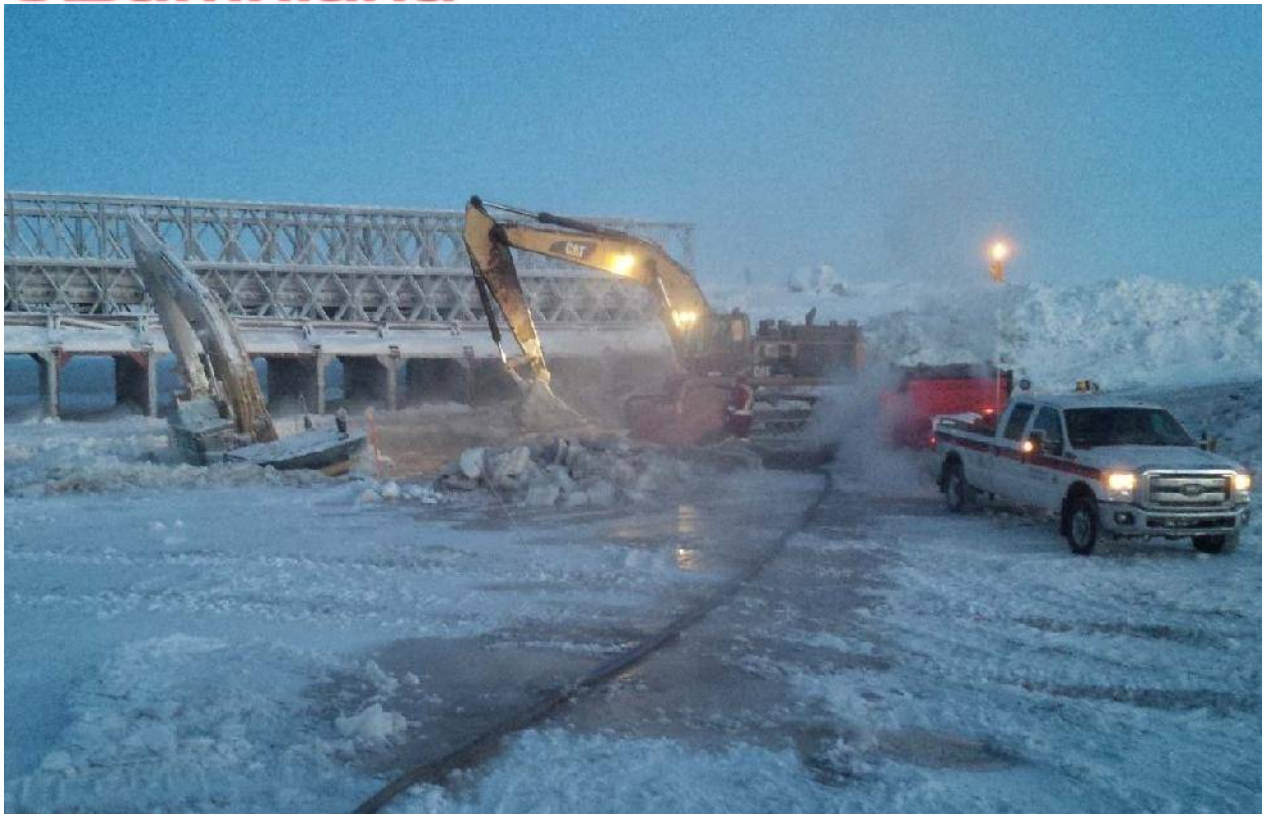


Photo 3 – EXC003 Extraction

Photo 4 – After EXC003 Extraction

Baffinland

ATTACHMENT C

ANALYTICAL WATER QUALITY RESULTS FROM ALS LABORATORIES

Baffinland Iron Mine's Corporation
(Oakville)
ATTN: Jim Millard
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 16-DEC-16
Report Date: 22-DEC-16 14:28 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1870980

Project P.O. #: 4500017476
Job Reference: 30 FEET DS OF EXCAVATOR AT KM 80
C of C Numbers:
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1870980-1 EXKM80-30DS Sampled By: DR/AV on 09-DEC-16 @ 15:00 Matrix: WATER							
Aggregate Organics							
Oil and Grease, Total	<2.0		2.0	mg/L	19-DEC-16	19-DEC-16	R3620682
Volatile Organic Compounds							
Benzene	<0.50		0.50	ug/L		19-DEC-16	R3619937
Ethylbenzene	<0.50		0.50	ug/L		19-DEC-16	R3619937
Toluene	<0.50		0.50	ug/L		19-DEC-16	R3619937
o-Xylene	<0.30		0.30	ug/L		19-DEC-16	R3619937
m+p-Xylenes	<0.40		0.40	ug/L		19-DEC-16	R3619937
Xylenes (Total)	<0.50		0.50	ug/L		19-DEC-16	
Surrogate: 4-Bromofluorobenzene	97.0		70-130	%		19-DEC-16	R3619937
Surrogate: 1,4-Difluorobenzene	101.1		70-130	%		19-DEC-16	R3619937
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		19-DEC-16	R3619937
F1-BTEX	<25		25	ug/L		22-DEC-16	
F2 (C10-C16)	<100		100	ug/L	20-DEC-16	21-DEC-16	R3621956
F3 (C16-C34)	<250		250	ug/L	20-DEC-16	21-DEC-16	R3621956
F4 (C34-C50)	<250		250	ug/L	20-DEC-16	21-DEC-16	R3621956
Total Hydrocarbons (C6-C50)	<370		370	ug/L		22-DEC-16	
Chrom. to baseline at nC50	YES				20-DEC-16	21-DEC-16	R3621956
Surrogate: 2-Bromobenzotrifluoride	101.7		60-140	%	20-DEC-16	21-DEC-16	R3621956
Surrogate: 3,4-Dichlorotoluene	94.8		60-140	%		19-DEC-16	R3619937

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Benzene	MS-B	L1870980-1
Matrix Spike	F1 (C6-C10)	MS-B	L1870980-1

Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTX-511-HS-WT	Water	BTEX by Headspace	SW846 8260 (511)

BTX is determined by analyzing by headspace-GC/MS.

ALS Test Code	Matrix	Test Description	Method Reference**
F1-F4-511-CALC-WT	Water	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

ALS Test Code	Matrix	Test Description	Method Reference**
F1-HS-511-WT	Water	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

ALS Test Code	Matrix	Test Description	Method Reference**
F2-F4-511-WT	Water	F2-F4-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

Fractions F2, F3 and F4 are determined by liquid/liquid extraction with a solvent. The solvent recovered from the extracted sample is treated with silica gel to remove polar material and then analyzed by GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

ALS Test Code	Matrix	Test Description	Method Reference**
OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

ALS Test Code	Matrix	Test Description	Method Reference**
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Water**							
Batch	**R3619937**							
WG2452788-4	**DUP**	**WG2452788-3**						
Benzene		10800	10900		ug/L	1.6	30	20-DEC-16
Ethylbenzene		2.25	2.12		ug/L	5.9	30	19-DEC-16
m+p-Xylenes		8.64	8.20		ug/L	5.2	30	19-DEC-16
o-Xylene		4.87	4.74		ug/L	2.7	30	19-DEC-16
Toluene		9.17	8.75		ug/L	4.7	30	19-DEC-16
WG2452788-1	**LCS**							
Benzene			108.7		%		70-130	19-DEC-16
Ethylbenzene			107.2		%		70-130	19-DEC-16
m+p-Xylenes			107.2		%		70-130	19-DEC-16
o-Xylene			106.9		%		70-130	19-DEC-16
Toluene			104.9		%		70-130	19-DEC-16
WG2452788-2	**MB**							
Benzene			<0.50		ug/L		0.5	16-DEC-16
Ethylbenzene			<0.50		ug/L		0.5	16-DEC-16
m+p-Xylenes			<0.40		ug/L		0.4	16-DEC-16
o-Xylene			<0.30		ug/L		0.3	16-DEC-16
Toluene			<0.50		ug/L		0.5	16-DEC-16
Surrogate: 1,4-Difluorobenzene			102.3		%		70-130	16-DEC-16
Surrogate: 4-Bromofluorobenzene			97.3		%		70-130	16-DEC-16
WG2452788-5	**MS**	**WG2452788-3**						
Benzene			N/A	MS-B	%		-	19-DEC-16
Ethylbenzene			115.8		%		50-140	19-DEC-16
m+p-Xylenes			115.3		%		50-140	19-DEC-16
o-Xylene			113.4		%		50-140	19-DEC-16
Toluene			111.4		%		50-140	19-DEC-16
F1-HS-511-WT	**Water**							
Batch	**R3619937**							
WG2452788-4	**DUP**	**WG2452788-3**						
F1 (C6-C10)		10500	10700		ug/L	2.2	30	20-DEC-16
WG2452788-1	**LCS**							
F1 (C6-C10)			85.0		%		80-120	19-DEC-16
WG2452788-2	**MB**							
F1 (C6-C10)			<25		ug/L		25	16-DEC-16
Surrogate: 3,4-Dichlorotoluene			100.3		%		60-140	16-DEC-16
WG2452788-5	**MS**	**WG2452788-3**						

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Water**							
Batch R3619937								
WG2452788-5 MS		**WG2452788-3**						
F1 (C6-C10)			N/A	MS-B	%		-	19-DEC-16
F2-F4-511-WT	**Water**							
Batch R3621956								
WG2454630-2 LCS								
F2 (C10-C16)			116.2		%		70-130	21-DEC-16
F3 (C16-C34)			115.9		%		70-130	21-DEC-16
F4 (C34-C50)			110.4		%		70-130	21-DEC-16
WG2454630-3 LCSD		**WG2454630-2**						
F2 (C10-C16)		116.2	116.0		%	0.2	50	21-DEC-16
F3 (C16-C34)		115.9	119.3		%	2.8	50	21-DEC-16
F4 (C34-C50)		110.4	117.8		%	6.5	50	21-DEC-16
WG2454630-1 MB								
F2 (C10-C16)			<100		ug/L		100	21-DEC-16
F3 (C16-C34)			<250		ug/L		250	21-DEC-16
F4 (C34-C50)			<250		ug/L		250	21-DEC-16
Surrogate: 2-Bromobenzotrifluoride			97.9		%		60-140	21-DEC-16
OGG-TOT-WT	**Water**							
Batch R3620682								
WG2454023-2 LCS								
Oil and Grease, Total			90.8		%		70-130	19-DEC-16
WG2454023-3 LCSD		**WG2454023-2**						
Oil and Grease, Total		90.8	94.1		%	3.6	40	19-DEC-16
WG2454023-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	19-DEC-16

Quality Control Report

Workorder: L1870980   Report Date: 22-DEC-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

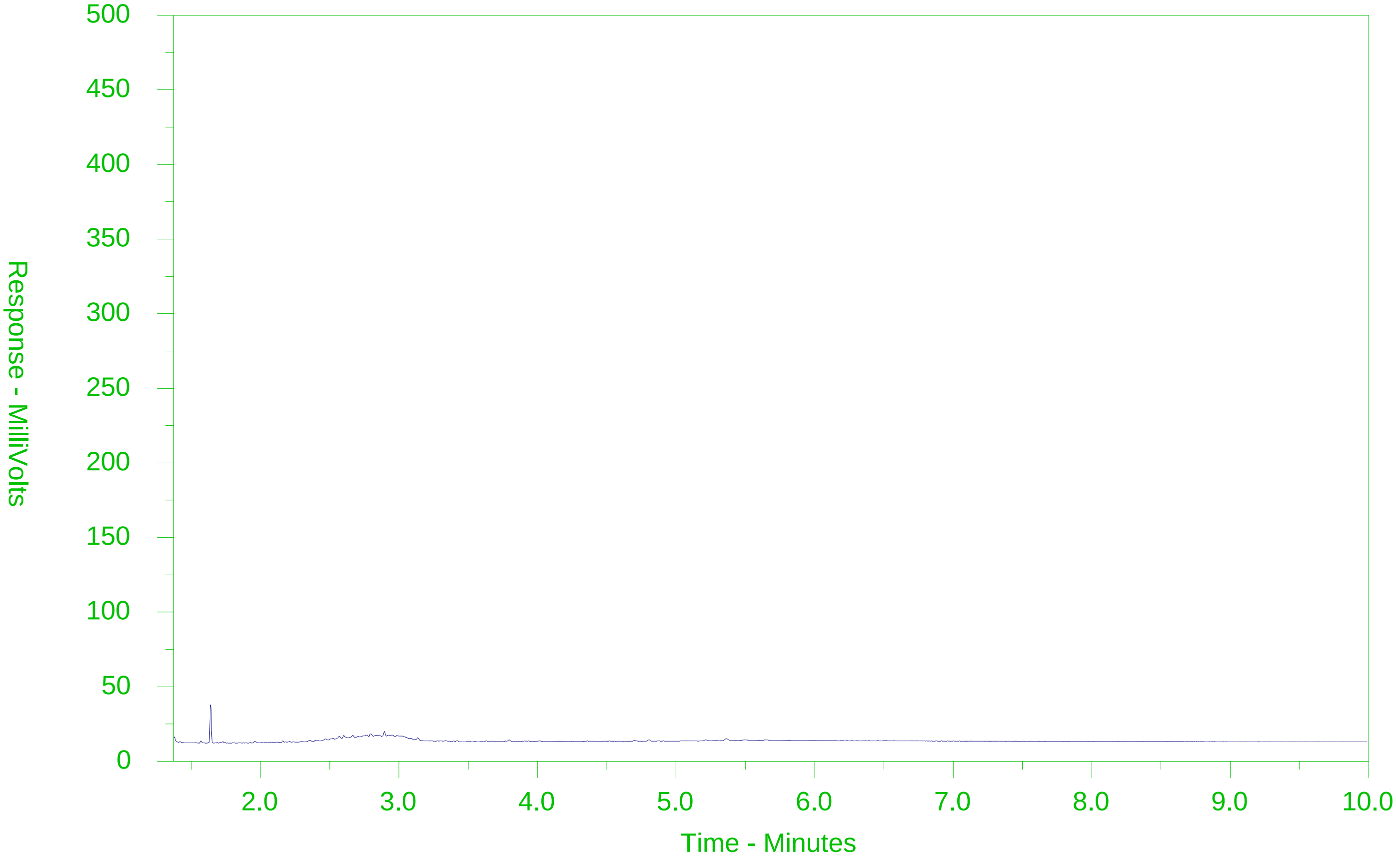
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1870980-1

Client Sample ID: EXKM80-30DS



←F2→	←F3→		←F4→
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

Printed on 12/22/2016 10:24:44 AM

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1870980-COFC

COC Number: 14 -

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Oakville, ON, L6H 0C3	Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0596 EXT 6016	Email 1 or Fax	bimcore@alsglobal.com	Specify Date Required for E2,E or P:
		Email 2		Analysis Request

Invoice To		Invoice Distribution	
Same as Report To	☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Copy of Invoice with Report	☐ Yes ☑ No	Email 1 or Fax	ap@baffinland.com
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	30 feet DS of Excavator at Km 80	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	Dec16A L1870980 aj	ALS Contact: Wayne Smith	Sampler: DR/AV

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX/PHCs/O&G	Number of Containers
1	EXKM80-30DS	9-Dec-16	15:00	Water	R	7

Drinking Water (DW) Samples[1] (client use)	
Are samples taken from a Regulated DW System?	☐ Yes ☑ No
Are samples for human drinking water use?	☐ Yes ☑ No

Sample from Actual Waste Rock Pond.

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐		SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☐ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated ☐			
INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	1.6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Andrew Vermeer	Date: 2016-12-14	Time: 17:30	Received by:	Date:	Time:	Received by: aj	Date: 16/12/16	Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Baffinland Iron Mine’s Corporation
(Oakville)
ATTN: Jim Millard,Allan Knight
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 23-DEC-16
Report Date: 30-DEC-16 11:43 (MT)
Version: FINAL

Client Phone: 416-364-8820

Certificate of Analysis

Lab Work Order #: L1872424

Project P.O. #: 4500017476
Job Reference: EXKM80
C of C Numbers:
Legal Site Desc: EXKM80

Wayne Smith, C.Chem., C.E.T.
Client Services Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1872424-1 EXKM80 Sampled By: CR/AV on 17-DEC-16 @ 11:00 Matrix: WATER							
Aggregate Organics							
Oil and Grease, Total	<2.0		2.0	mg/L	23-DEC-16	23-DEC-16	R3625017
Volatile Organic Compounds							
Benzene	<0.50		0.50	ug/L		28-DEC-16	R3624116
Ethylbenzene	<0.50		0.50	ug/L		28-DEC-16	R3624116
Toluene	<0.50		0.50	ug/L		28-DEC-16	R3624116
o-Xylene	<0.30		0.30	ug/L		28-DEC-16	R3624116
m+p-Xylenes	<0.40		0.40	ug/L		28-DEC-16	R3624116
Xylenes (Total)	<0.50		0.50	ug/L		28-DEC-16	
Surrogate: 4-Bromofluorobenzene	94.8		70-130	%		28-DEC-16	R3624116
Surrogate: 1,4-Difluorobenzene	99.9		70-130	%		28-DEC-16	R3624116
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		28-DEC-16	R3624116
F1-BTEX	<25		25	ug/L		30-DEC-16	
F2 (C10-C16)	<100		100	ug/L	29-DEC-16	30-DEC-16	R3625560
F3 (C16-C34)	<250		250	ug/L	29-DEC-16	30-DEC-16	R3625560
F4 (C34-C50)	<250		250	ug/L	29-DEC-16	30-DEC-16	R3625560
Total Hydrocarbons (C6-C50)	<370		370	ug/L		30-DEC-16	
Chrom. to baseline at nC50	YES				29-DEC-16	30-DEC-16	R3625560
Surrogate: 2-Bromobenzotrifluoride	93.8		60-140	%	29-DEC-16	30-DEC-16	R3625560
Surrogate: 3,4-Dichlorotoluene	104.0		60-140	%		28-DEC-16	R3624116
Glycols							
Diethylene Glycol	<5.0		5.0	mg/L		23-DEC-16	R3624355
Ethylene Glycol	<5.0		5.0	mg/L		23-DEC-16	R3624355
1,3-Propanediol	<5.0		5.0	mg/L		23-DEC-16	R3624355
1,2-Propanediol	<5.0		5.0	mg/L		23-DEC-16	R3624355
Triethylene Glycol	<5.0		5.0	mg/L		23-DEC-16	R3624355

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTX-511-HS-WT	Water	BTEX by Headspace	SW846 8260 (511)

BTX is determined by analyzing by headspace-GC/MS.

ALS Test Code	Matrix	Test Description	Method Reference**
F1-F4-511-CALC-WT	Water	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

ALS Test Code	Matrix	Test Description	Method Reference**
F1-HS-511-WT	Water	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

ALS Test Code	Matrix	Test Description	Method Reference**
F2-F4-511-WT	Water	F2-F4-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

Fractions F2, F3 and F4 are determined by liquid/liquid extraction with a solvent. The solvent recovered from the extracted sample is treated with silica gel to remove polar material and then analyzed by GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

ALS Test Code	Matrix	Test Description	Method Reference**
GLYCOL-1-WT	Water	Glycol List 1	EPA 8000A

Water samples are analyzed by direct injection using GC/FID.

ALS Test Code	Matrix	Test Description	Method Reference**
OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

ALS Test Code	Matrix	Test Description	Method Reference**
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard,Allan Knight

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Water**							
Batch R3624116								
WG2455460-4 DUP		**WG2455460-3**						
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	28-DEC-16
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	28-DEC-16
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	28-DEC-16
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	28-DEC-16
Toluene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	28-DEC-16
WG2455460-1 LCS								
Benzene			99.7		%		70-130	23-DEC-16
Ethylbenzene			93.5		%		70-130	23-DEC-16
m+p-Xylenes			94.2		%		70-130	23-DEC-16
o-Xylene			95.1		%		70-130	23-DEC-16
Toluene			95.9		%		70-130	23-DEC-16
WG2455460-2 MB								
Benzene			<0.50		ug/L		0.5	28-DEC-16
Ethylbenzene			<0.50		ug/L		0.5	28-DEC-16
m+p-Xylenes			<0.40		ug/L		0.4	28-DEC-16
o-Xylene			<0.30		ug/L		0.3	28-DEC-16
Toluene			<0.50		ug/L		0.5	28-DEC-16
Surrogate: 1,4-Difluorobenzene			98.9		%		70-130	28-DEC-16
Surrogate: 4-Bromofluorobenzene			96.3		%		70-130	28-DEC-16
WG2455460-5 MS		**WG2455460-3**						
Benzene			99.9		%		50-140	28-DEC-16
Ethylbenzene			91.3		%		50-140	28-DEC-16
m+p-Xylenes			92.7		%		50-140	28-DEC-16
o-Xylene			93.1		%		50-140	28-DEC-16
Toluene			95.0		%		50-140	28-DEC-16
F1-HS-511-WT	**Water**							
Batch R3624116								
WG2455460-4 DUP		**WG2455460-3**						
F1 (C6-C10)		<25	<25	RPD-NA	ug/L	N/A	30	28-DEC-16
WG2455460-1 LCS								
F1 (C6-C10)			88.5		%		80-120	23-DEC-16
WG2455460-2 MB								
F1 (C6-C10)			<25		ug/L		25	28-DEC-16
Surrogate: 3,4-Dichlorotoluene			100.1		%		60-140	28-DEC-16
WG2455460-5 MS		**WG2455460-3**						

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard,Allan Knight

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Water**							
Batch R3624116								
WG2455460-5 MS		**WG2455460-3**						
F1 (C6-C10)			82.2		%		60-140	28-DEC-16
F2-F4-511-WT	**Water**							
Batch R3625560								
WG2457959-2 LCS								
F2 (C10-C16)			104.2		%		70-130	30-DEC-16
F3 (C16-C34)			109.0		%		70-130	30-DEC-16
F4 (C34-C50)			109.4		%		70-130	30-DEC-16
WG2457959-3 LCSD		**WG2457959-2**						
F2 (C10-C16)		104.2	105.2		%	1.0	50	30-DEC-16
F3 (C16-C34)		109.0	108.7		%	0.3	50	30-DEC-16
F4 (C34-C50)		109.4	106.3		%	2.9	50	30-DEC-16
WG2457959-1 MB								
F2 (C10-C16)			<100		ug/L		100	30-DEC-16
F3 (C16-C34)			<250		ug/L		250	30-DEC-16
F4 (C34-C50)			<250		ug/L		250	30-DEC-16
Surrogate: 2-Bromobenzotrifluoride			99.8		%		60-140	30-DEC-16
GLYCOL-1-WT	**Water**							
Batch R3624355								
WG2456974-4 DUP		**L1872424-1**						
Ethylene Glycol		<5.0	<5.0	RPD-NA	mg/L	N/A	30	23-DEC-16
Diethylene Glycol		<5.0	<5.0	RPD-NA	mg/L	N/A	30	23-DEC-16
1,2-Propanediol		<5.0	<5.0	RPD-NA	mg/L	N/A	30	23-DEC-16
1,3-Propanediol		<5.0	<5.0	RPD-NA	mg/L	N/A	30	23-DEC-16
Triethylene Glycol		<5.0	<5.0	RPD-NA	mg/L	N/A	30	23-DEC-16
WG2456974-2 LCS								
Ethylene Glycol			100.2		%		70-130	23-DEC-16
Diethylene Glycol			97.8		%		70-130	23-DEC-16
1,2-Propanediol			102.8		%		70-130	23-DEC-16
1,3-Propanediol			99.8		%		70-130	23-DEC-16
Triethylene Glycol			96.2		%		70-130	23-DEC-16
WG2456974-3 MB								
Ethylene Glycol			<5.0		mg/L		5	23-DEC-16
Diethylene Glycol			<5.0		mg/L		5	23-DEC-16
1,2-Propanediol			<5.0		mg/L		5	23-DEC-16

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: Jim Millard,Allan Knight

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
GLYCOL-1-WT	**Water**							
Batch R3624355								
WG2456974-3 MB								
1,3-Propanediol			<5.0		mg/L		5	23-DEC-16
Triethylene Glycol			<5.0		mg/L		5	23-DEC-16
WG2456974-5 MS		**L1872424-1**						
Ethylene Glycol			101.1		%		50-150	23-DEC-16
Diethylene Glycol			97.8		%		50-150	23-DEC-16
1,2-Propanediol			104.8		%		50-150	23-DEC-16
1,3-Propanediol			102.6		%		50-150	23-DEC-16
Triethylene Glycol			96.2		%		50-150	23-DEC-16
OGG-TOT-WT	**Water**							
Batch R3625017								
WG2456965-2 LCS								
Oil and Grease, Total			97.9		%		70-130	23-DEC-16
WG2456965-3 LCSD		**WG2456965-2**						
Oil and Grease, Total		97.9	94.1		%	4.0	40	23-DEC-16
WG2456965-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	23-DEC-16

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: Jim Millard,Allan Knight

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

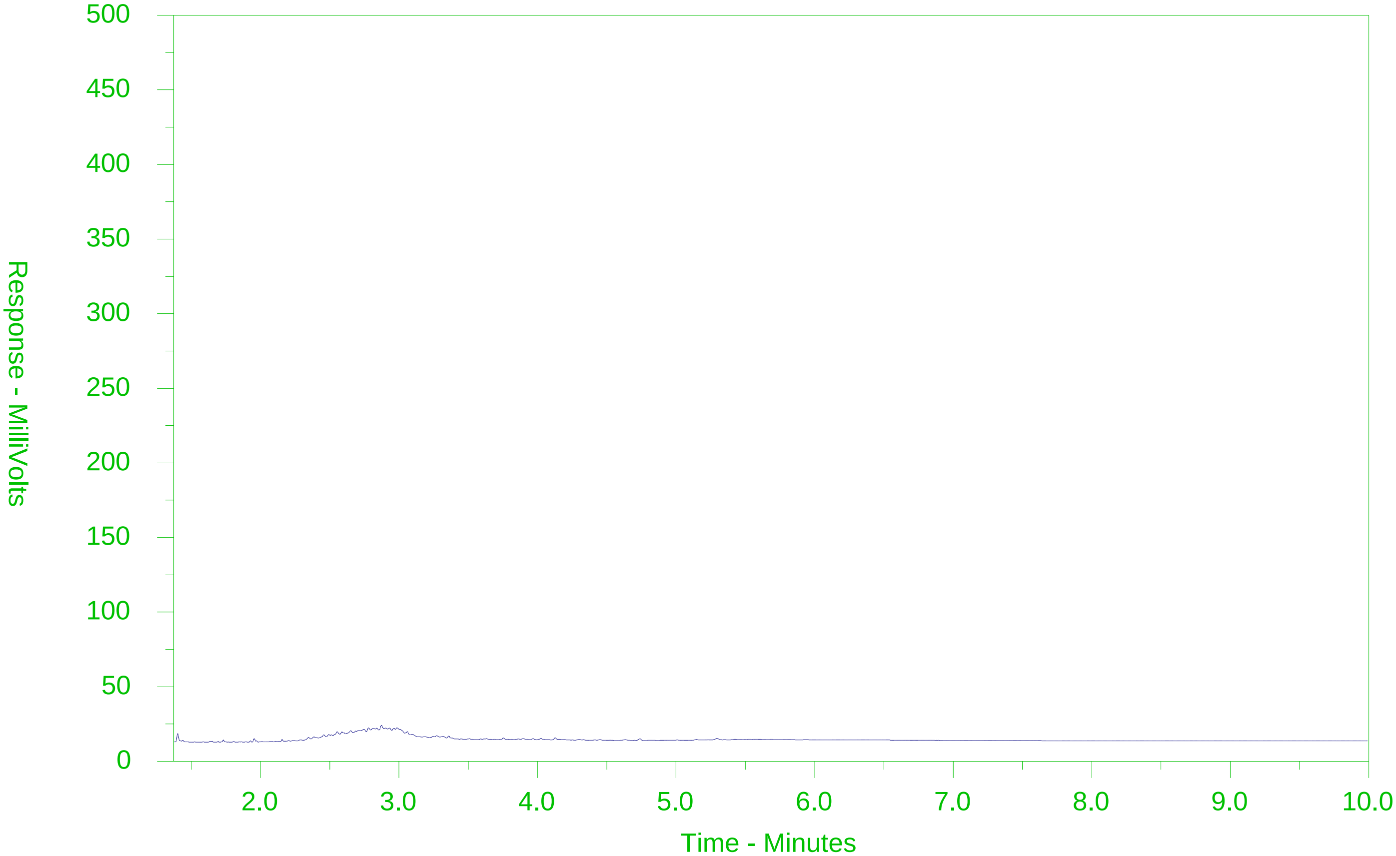
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1872424-1
Client Sample ID: EXKM80



←F2→	←F3→		←F4→
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

[illegible]

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1872424-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Oakville, ON, L6H 0C3	Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0596 EXT 6016	Email 1 or Fax	bimcore@alsglobal.com	Specify Date Required for E2,E or P:
		Email 2		Analysis Request

Invoice To		Invoice Distribution	
Same as Report To	☑ Yes ☐ No		
Copy of Invoice with Report	☐ Yes ☑ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax	ap@baffinland.com
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	EXKM80	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	Dec23H L1872424	ALS Contact: Wayne Smith	Sampler: DR/AV

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX/PHCs/O&G	Glycol	Number of Containers
\	EXKM80	17-Dec-16	11:00	Water	R	R	9

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Sample from Actual Waste Rock Pond.

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐		SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☐ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated ☐			

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	5.9

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Andrew Vermeer	Date: 2016-12-20	Time: 19:30	Received by:	Date:	Time:	Received by: [signature]	Date: 23/12/16	Time: 9:20

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION   WHITE - LABORATORY COPY   YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

8

January 26, 2017

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0
Justin.Hack@aandc-aadnc.gc.ca

Director, Major Projects
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #16-434, Reported on December 27, 2016
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

At 5:45 am Baffinland's vacuum truck operator was off loading raw sewage from the vacuum truck into the waste water treatment plant (WWTP). During the transfer, the operator noticed sewage coming out of the WWTP west door. The operators then turned off the vacuum truck pump. Upon investigation, the spill source was determined to be a 1/2" valve left in an improper position inside the WWTP on the influent line. Approximately 150L of raw sewage was released to the adjacent WWTP pad. An additional 150L recovered from inside the WWTP, which did not impact the receiving environment, was reintroduced back into the sewage treatment system. The closest water body is approximately 100 m to the southwest and is currently frozen.

Immediate and Follow-Up Action:

The operator turned off the vacuum truck pump and notified the Surface Works supervisor who reported the incident. The accessible contaminated snow was shoveled into Quatrex bags and disposed of in the Mine Site Polishing Waste Stabilisation Pond 1 (PWSP 1), a lined engineered containment pond.

Recommendations:

Supervisors need to ensure all operators receive proper training and fully understand their task. Operator must check valve settings every time before offloading sewage from the vacuum truck into the WWTP.

Current Status:

The WWTP is currently fully operational and vacuum truck operators have received training on the offloading procedure.

Should you require further information or clarification on the above noted spill, please feel free to contact William Bowden at (647) 253-0596 x6016, Laura Taylor (647) 253- 0596 x6016 or Allan Knight at (647) 253-0596 x6010.

Prepared By:

Connor Devereaux,
Environmental Coordinator

Reviewed by:

William Bowden,
Environmental Superintendent

Attach: Photos, Map, NT-NU Spill Report

cc. Todd Burlingame, Wayne McPhee, Sylvain Proulx, Robert Gagne, Anant Minhas, Laura Taylor (Baffinland), Stephen Bathory (QIA), Scott Burgess, Erik Allain, Sarah Forte, Jonathan Mesher (INAC).

Photo 1 – WWTP Raw Sewage Spill

Photo 2 – WWTP Spill Post Clean Up

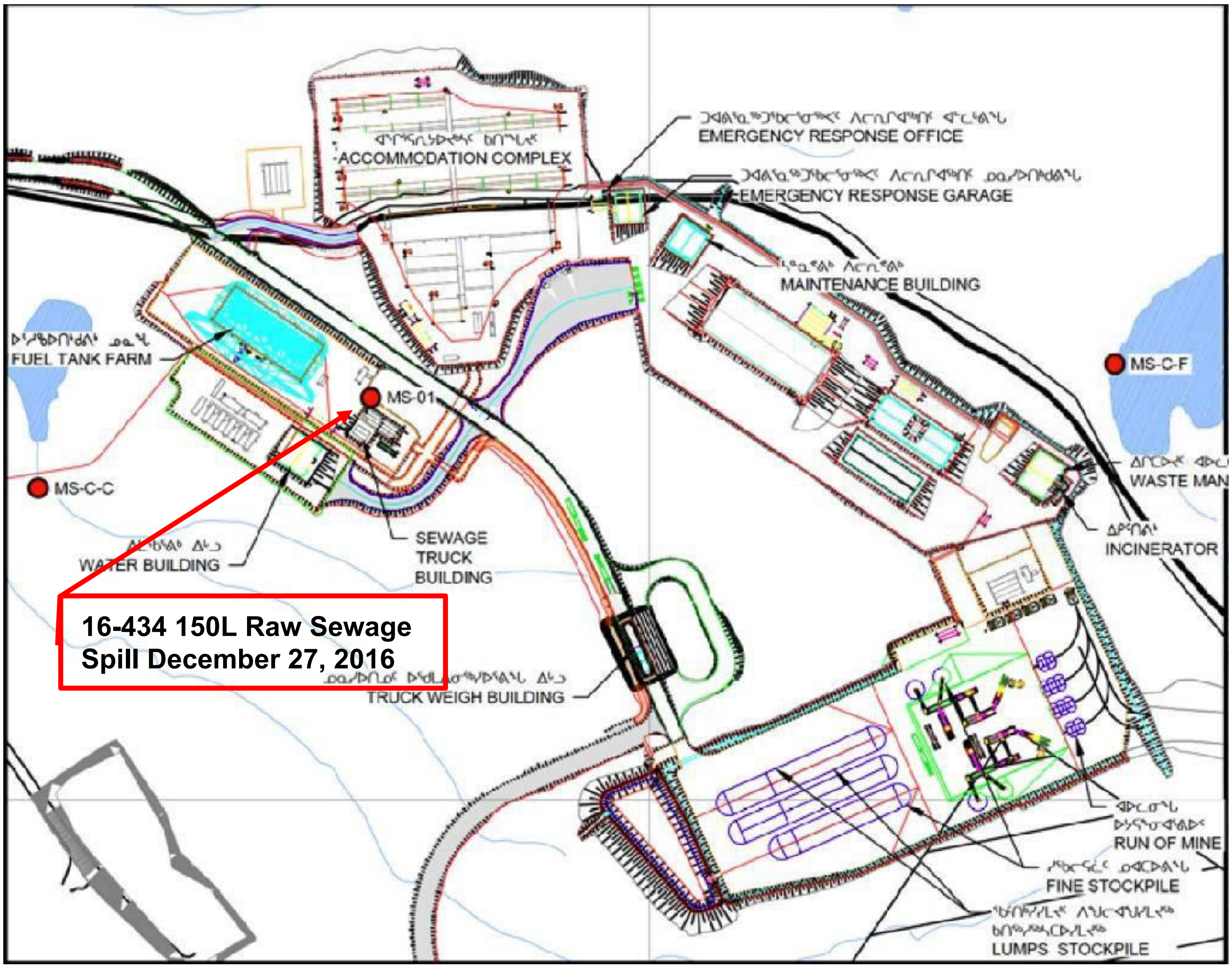


Figure 1 - Spill Location

Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 12-27-2016	REPORT TIME 06:00	☒ ORIGINAL SPILL REPORT, OR	REPORT NUMBER 16 - 434
B	OCCURRENCE DATE: MONTH – DAY – YEAR 12-27-2016	OCCURRENCE TIME 05:45	☐ UPDATE # ______ TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE) 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION Mary River Mine Site, Baffin Island, NU	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES 71 MINUTES 18 SECONDS 49	LONGITUDE DEGREES 79 MINUTES 17 SECONDS 06		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Sutie 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION N/A		
H	PRODUCT SPILLED Raw Sewage	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES 150 Litres	U.N. NUMBER N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE) N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES N/A	U.N. NUMBER N/A	
I	SPILL SOURCE Vacuum Truck	SPILL CAUSE 1/2" valve inside WWTP	AREA OF CONTAMINATION IN SQUARE METRES 15 m2	
J	FACTORS AFFECTING SPILL OR RECOVERY Spill inside and beside WWTP	DESCRIBE ANY ASSISTANCE REQUIRED N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT N/A	

K — ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

At 5:45 am Baffinland's vacuum truck operator was off loading raw sewage from the vacuum truck into the waste water treatment plant (WWTP). During the transfer, the operator noticed sewage coming out of the WWTP west door. The operator immediately turned off the vacuum truck pump and notified his supervisor, who reported the incident. Upon initial investigation, the spill source was determined to be a 1/2" valve inside the WWTP on the influent line. Approximately 150L of raw sewage was released to the adjacent WWTP pad, impacting an area of 15m2. An additional 150L recovered from inside the WWTP, which did not impact the receiving environment, was reintroduced back into the sewage treatment system. The closest water body is approximately 100 m to the southwest and is currently frozen; the spill was confined to the WWTP pad. This spill is being reported as required by the conditions of water license no. 2AM-MRY1325, Part H , item 9 (b) pursuant to subsection 12(3) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act.

L	REPORTED TO SPILL LINE BY William Bowden	POSITION Env. Superintendent	EMPLOYER Baffinland	LOCATION CALLING FROM 647-253-0596	TELEPHONE ext. 6016
M	ANY ALTERNATE CONTACT Jim Millard	POSITION Env. Manager	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION Off Site	ALTERNATE TELEPHONE 902-403-1337

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF 1

Figure 2 – NT-NU Spill Report

APPENDIX D.8

2017 MARGINAL RECLAMATION AND CLOSURE SECURITY ESTIMATE

Date: January 20, 2017

File No: 2AM-MRY1325
By Email and Regular Mail

Honourable Carolyn Bennett, PC, MP
Minister of Indigenous and Northern Affairs Canada
21st Floor, 10 Wellington, North Tower
Gatineau, QB K1A 0H4
Email: carolyn.bennett@parl.gc.ca;
minister@aadnc-aandc.gc.ca

PJ Akeeagok, President
Qikiqtani Inuit Association
P.O. Box 1340
Iqaluit, NU X0A 0H0
Email: pakeeagok@qia.ca

Todd Burlingame
VP, Sustainable Development
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3
Email: todd.burlingame@baffinland.com

Re: Type "A" Water Licence No. 2AM-MRY1325, Baffinland Iron Mines Corporation Licence, Mary River Project: Direction from Nunavut Water Board Under the 2017 Annual Security Review Process Established Under Part C and Schedule C of the Water Licence

As set out in the Nunavut Water Board's (NWB or Board) Decision[1] recommending the issuance of Type "A" Water Licence No. 2AM-MRY1325 (the Water Licence) in 2013 and Amended Licence in 2015, and as required under Part C and Schedule C of the Water Licence, the amount of financial security the Board requires Baffinland Iron Mines Corporation (the Licensee or BIMC) to post under the Water Licence is subject to periodic review, and adjustment, if required

[1] Nunavut Water Board, Reasons for Decision for 2AM-MRY1325, June 12, 2013 at pp. 54-63.

by the Board, under the process described in the Water Licence as the Annual Security Review (ASR). The amount of security required to be posted following the ASR is based on both an estimate of the highest reclamation liability for land and water in the upcoming year (the global security amount), as well as any reductions from the global security amount, up to and including the previous year, to reflect the financial security that may be provided by BIMC to the Qikiqtani Inuit Association (QIA) under the reclamation requirements of the QIA commercial lease and to INAC for reclamation under the Water Licence. This information and the parties' comment submissions, provided during the course of the ASR, are considered by the Board in order to determine the total security amount that must be held under the Water Licence for the upcoming year.

As indicated in the NWB's guidance letter issued to the parties on October 5, 2016 with respect to the 2017 ASR Process required to set the security amount that must be posted under the Water Licence to cover liabilities up to and including the first quarter of 2017 to the first quarter of 2018 (the 2017 ASR), the Board specifically requested comment on the following:

> *Is the existing global security amount as set by the Board during the 2016 ASR process adequate to reflect the updated scope of activities and undertakings proposed to be undertaken by BIMC in its 2017 Work Plan (to be filed with the Board by November 1, 2016 as required under Schedule J, Item 1 in the Licence)?*

After the NWB's October 5, 2016 correspondence commenced the 2017 ASR process and the NWB's additional guidance, a number of submissions in support of the 2017 ASR Process from the Proponent, the QIA and INAC were received and distributed. **Appendix A**, attached to this correspondence, provides a summary of the procedural history in addition to the key documentation provided and activities undertaken by the NWB associated with the 2017 ASR Process.

The Board has placed all non-confidential information associated with the 2017 ASR Process on its public registry. For further details, consult the NWB's File Transfer Protocol (FTP) site using the following link:

> ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-MRY1325%20BIMC/3%20TECH/2%20SECURITY%20(C)/2016/

The NWB's Jurisdiction to Furnish Security Under the Water Licence

The Board's jurisdiction to require a licensee to furnish security is established under s. 76 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* as follows:

> *76. (1) The Board may require an applicant, a licensee or a prospective assignee to furnish and maintain security with the Minister in the form, of the nature, subject to such terms and conditions and in an amount prescribed by, or determined in accordance with, the regulations or that is satisfactory to the Minister.*

In addition, the *Nunavut Waters Regulations* (the Regulations) further specify the limits on the Board's jurisdiction and state the following:

> *10. (1) For the purposes of subsection 76(1) of the Act, the Board may fix the amount of security required to be furnished by an applicant for a licence, a licensee or a prospective assignee in an amount not exceeding the aggregate of*
> *(a) the costs of the abandonment of the undertaking;*
> *(b) the costs of the restoration of the site of the undertaking;*
> *(c) the costs of any ongoing measures that may remain to be taken after the abandonment of the undertaking; and*
> *(d) the compensation that a person, including the designated Inuit organization, who is adversely affected by the use of waters or deposit of waste may be entitled to under section 13 of the Act.*

With respect to this Water Licence in particular, the Board recognized at the outset that because a significant part of the Mary River Project was located on Inuit Owned Land (IOL), it was reasonable to expect that the QIA would wish to hold a substantial portion of the security for reclamation and restoration of the undertaking on IOL. This also meant that if the security amount required under the Water Licence was the full global security amount that would be required for full reclamation of the undertaking, with no consideration of the security that has been secured by the QIA for reclamation under the commercial lease between BIMC and the QIA, there could be significant over-bonding. This situation would result in the Board exercising its jurisdiction to fix an amount of security in excess of what is permissible under s. 10(1) of the Regulations.

Reflecting these concerns about over-bonding, and as set out in the Board's previous decisions, the Board developed an approach to security that would allow the Board to factor security held under land-based instruments into the Board's fixing of security under the water licences for the Project:

> *… the Board's focus in assessing security is that the Applicant must have posted sufficient security, through <u>all means, when taken together</u>, to ensure that the overall reclamation of the site (land and water) has been adequately addressed. Consequently, the Board's starting point to assess security remains considering the security requirements holistically and then deducting from the aggregate land and water reclamation totals any security held under other instruments, with the remainder being secured under the water licence.* [2]

On this basis, the Board incorporated into Part C and Schedule C of the Water Licence a mechanism by which the Board can receive evidence from BIMC and the QIA regarding the financial security requirements under the commercial lease to be considered in the Board's fixing of the amount of security that should be held under the Water Licence. In addition to recognizing that the Board must consider reclamation security held by landowners into the total financial security for the undertaking, the Board was also be aware that the total costs of security required to ensure reclamation of the undertaking may vary greatly over the life cycle of the Mary River Project. Consequently, the Board

[2] Nunavut Water Board, Reasons for Decision for 2AM-JER1119, December 21, 2012 at p. 47.

included in Part C and Schedule C of the Water Licence a mechanism for conducting periodic review of the security fixed under the Water Licence to reflect the objective, as stated in the *Mine Site Reclamation Policy for Nunavut (INAC, 2002) that:*

> *The total financial security for final reclamation required at any time during the life of the mine should be equal to the total outstanding reclamation liability for land and water combined (calculated at the beginning of the work year, to be sufficient to cover the highest liability over that time period)* [3]

The 2017 Annual Security Review (ASR) Process

To date, the NWB has conducted security reviews under the Water Licence annually commencing in 2013. Although the timing and detailed process steps have varied slightly from year to year, key elements remain the same. The 2017 ASR Process commenced with the NWB providing correspondence in October 2016 to all the parties providing a process outline and proposed timelines. BIMC then provided a Work Plan in November 2016 detailing the works and activities planned for the twelve-month period commencing in March 2017 to March 2018 (the 2017 Work Plan), coupled with an updated reclamation estimate that reflected any changes to the global financial security amount required to reclaim the undertaking if all on-going and new activities as identified in the 2017 Work Plan were to proceed.

The NWB then received comments on both the 2017 Work Plan and the updated reclamation estimate from the two land owners, Indigenous and Northern Affairs (INAC) in respect of security held for Crown Lands and in respect of the Water Licence and the Qikiqtani Inuit Association (QIA) in respect of the reclamation security held by the QIA under the commercial lease. The NWB hosted an ASR teleconference on December 9, 2016 with the parties to present their submissions to the Board and discuss any outstanding technical or process issues. Following the ASR teleconference, parties filed additional submissions. When all submissions have been received on January 6, 2017, the security issue was remitted to the 3-Member Panel duly appointed by the Board to make decisions in respect of Water Licence 2AM-MRY1325 (P4 or the Panel). On January 17, 2017, the Panel met to consider the submissions received during the 2017 ASR Process and as required by Part C and Schedule C of the Licence, and by Motions #2016-12-P4-03 and #2016-12-P4-04, provided the direction contained in this letter regarding the global security amount for the reclamation of the undertaking and also specified the amount of security that must be held under the Water Licence.

During recent ASR Processes and also in the 2017 ASR Process, INAC expressed the view that a change to the security to be held under the Water Licence is an amendment to a Type "A" Water Licence that would trigger various notice and comment requirements. The Board notes that the Water Licence, Part C, Item 1(a) and (b), clearly set out that changes to the amount of security that are the outcome of the ASR Process conducted under the Water Licence are to be dealt with as part of the on-going administration of the Licence and do not require an amendment to the Licence. On this basis, and has been the case with past adjustments to the security held under the Water Licence associated with previous ASR processes, the NWB does not consider an adjustment

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[3] *Mine Site Reclamation Policy for Nunavut*, 2002, Minister of Indian Affairs and Northern Development, (Ottawa: Minister of Public Works and Government Services Canada, 2002) available on-line: http://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/recpolnuna_1100100036043_eng.pdf.

to the security required to be posted under the Water Licence resulting from the 2017 ASR Process to require an amendment to the Water Licence.

Summary of Submissions Received During the ASR Process Relating to The Global Security Amount and Security Held under Licence 2AM-MRY1325

Consistent with previous Annual Security Reviews, the NWB has received several submissions from the parties in support of the 2017 ASR process. The following sections provide an overview of some of the key submissions provided by the various parties during the 2017 ASR Process.

BAFFINLAND IRON MINES CORPORATION MAJOR SUBMISSIONS

Baffinland Iron Mines Corporation (BIMC or the Licensee) provided the following key submissions in support of the 2017 ASR Process:

- 2017 Work Plan
- 2017 Work Plan Addendum
- 2017 ASR Presentation
- BIMC Response to QIA's December 12, 2016 Correspondence

2017 Work Plan

As required under provisions of Part J in Licence No. 2AM-MRY1325 (the Water Licence), BIMC filed, on November 4, 2016, the 2017 Work Plan (2017 Work Plan) for the Mary River Project. The 2017 Work Plan, which is one of the key elements required for the Board's periodic review of security as mandated by Part C and Schedule C of the Water Licence, addresses the following components:

- Provide details regarding mining and associated work and activities that occurred or had been proposed but were not undertaken over the previous year in addition to information on works and activities proposed for the upcoming year.
- Assess the previous and upcoming years' activities, with the aim of identify any changes in environmental liabilities or risk associated with the Project that would affect the amount of reclamation security required for the Project to allow a third party contractor to perform reclamation under a worst case scenario, and identify any associated changes to the amount of reclamation security held under all instruments.
- Examine changes that the proposed works and activities have on other Project variables such as management plans, existing infrastructure, progressive reclamation and more.

Details contained in BIMC's 2017 Work Plan indicated that ongoing development of the mine will continue over the 2017 – 2018 period. Similar to the previous years' work plans, the 2017 Work Plan included details regarding new and ongoing works and activities as well as works and activities that had been proposed under the 2016 Work Plan but were not carried out as planned, will not be carried out at all in the future, or that were deferred in 2016 and carried over into the 2017 Work Plan.

The following summarizes the main activities, works, or undertakings expected to be carried out under the 2017 Work Plan:

- Continued development and operation of the mine, ore crushing and land transportation, stockpiling and marine shipment of ore;
- Continued development and construction of infrastructure required at Milne Port and the Mary River Mine Site and along the Tote Road for the Mary River Project;
- Mobilization of an additional 49-person camp at Milne Port and continued operation of the Mine Site and Milne Port Camps to support on-going operations and construction activities which will include the use of water and deposit of waste as authorized under existing licences;
- On-going operation of already permitted quarry and borrow sources; there are also additional planned quarries or borrow areas along the Tote Road that have been identified and will be used during 2017;
- Mobilization of supplies at Milne Port including vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port during open water (approximately between mid-July and mid-October 2017). Materials, fuel and supplies required for operation and construction activities will be transported to the Mine Site year round via the Tote Road;
- Geotechnical drilling may be required to support engineering, design and construction activities of the Project;
- On-going environmental effects studies and baseline data collection will continue to support the construction and operation of the Project as well as for future engineering requirements;
- Continued environmental monitoring in accordance with the approved Project Certificate, licenses, authorizations, management plans and environmental effects monitoring plans;
- On-going exploration activities including mapping, prospecting, sampling and geophysics; and
- Potential drilling and/or trenching program; however, these items had not yet been finalized at the time the 2017 Work Plan was submitted.

Based on the scope of work proposed in the 2017 Work Plan and considering the works and activities not undertaken under the 2016 Work Plan as well as works and activities carried over from the 2016 to the 2017 Work Plan, BIMC proposed that the overall reclamation security for the Project be reduced from the $**50,055,500** fixed by the Board as the global security amount under the 2016 Work Plan to **$48,145,000** as the global security amount proposed by BIMC under the 2017 Work Plan.

BIMC indicated that the following main factors provided the rationale for changes to the global financial security estimate required to reclaim the undertaking:

- Adjustments to or removal of direct cost items to account for changes in Project planning and execution based on cost reconciliation;
- Removal of grade and re-contour costs allocated for areas that were identified in the 2016 Work Plan but that were not disturbed in 2016;
- Changes to the closure scenario assumption considered for the Project;
- New activities planned for the 2017 period;

- Refinements of the direct cost assumptions related to buildings and foundations, mechanical and mobile equipment, cabling, consumables, site works; and
- Refinement of indirect cost assumptions and cost pertaining to on-site fuel demobilization and reclamation-fuel mobilization, contract administration, engineering fees, and contingency and more.

2017 Marginal Closure and Reclamation Security Estimate – Revision (Addendum)

On November 24, 2016, BIMC submitted an addendum to its marginal closure and reclamation estimate included in its 2017 Work Plan. BIMC indicated that the Addendum was intended to address feedback received from interested parties as well as to update information to better reflect the 2017 Work Plan.

The Addendum identified modifications to the 2017 Work Plan associated with mobile and mechanical equipment capture that were re-categorized to address the comments of Interveners. In addition, clarifications were provided in respect of the additional 49 – person camp, and a truck wash building to be constructed in 2017. Based on those modifications, BIMC proposed an increase to the overall reclamation security for the Project for the 2017 – 2018 period, from **$48,145,000**, as originally proposed under the 2017 Work Plan, to **$49,271,000** under the 2017 Work Plan Addendum.

2017 Annual Security Review (ASR) Summary Presentation

On December 8, 2016, in advance of the ASR Teleconference, BIMC provided, a copy of its 2017 Annual Security Review (ASR) Summary Presentation, dated December 9, 2016.

The presentation included details regarding proposed work planned for the 2017 – 2018 period under the Water Licence and commercial lease and updates to the direct and indirect costs associated with these proposed works and activities, as well as changes or updates to the original BIMC cost estimates provided in the 2017 Work Plan as detailed in the 2017 Work Plan Addendum. The presentation also outlined BIMC's key assumptions in developing the proposed reclamation estimate for the Project, direct and indirect cost reconciliation associated with the 2016 Work Plan, and issues raised by parties and the Board during the 2017 ASR Process. At the conclusion of the presentation, BIMC reiterated that its proposed reclamation security for the Project for the 2017 – 2018 period was estimated at **$49,271,000**, a decrease of approximately **$785,000** from the global security amount fixed by the Board after the 2016 ASR Process.

BIMC's Response to QIA's December 12, 2016 Correspondence

Following the ASR Teleconference, BIMC provided its response to correspondence from the QIA dated December 12, 2016 regarding *Financial Security Assessment, Inflation and Joint Submission*. BIMC indicated that while it disagreed with the QIA's position that inflation should be applied to the updated estimate associated with the 2017 Work Plan and provided additional information to substantiate its position, BIMC remained committed to developing a joint submission with the QIA to be provided to the Board in January 2017.

QIA MAJOR SUBMISSIONS

Similar to BIMC, the QIA provided several submissions in support of the 2017 ASR Process. The following sections summarize the QIA's key submissions, which include:

- QIA's 2017 Comprehensive Security Estimate
- QIA's 2017 Comprehensive Security Estimate Update
- 2017 ASR Teleconference Speaking Notes
- December 12, 2016 Correspondence

2017 Comprehensive Security Estimate Submission

On December 2, 2016 the QIA submitted a cover letter and accompanying 2017 Comprehensive Security Estimate for the Mary River Project to be considered by the Board in the 2017 ASR Process. Based on the QIA's detailed review and as outlined in the QIA's submission, the QIA determined that the global security amount that should be held under the commercial lease for the 2017 period was **$56,317,000**.

The QIA indicated that its estimate was based on the QIA's *Abandonment and Reclamation Policy* for use with reclamation activities on Inuit Owned Land, previous project-specific reclamation estimates prepared by the QIA, and findings linked to the QIA's June and August 2016 Environmental Inspections and September 2016 Audit.

The QIA highlighted in its submission that there was a high degree of uncertainty in the 2017 Work Plan pertaining to the Tote Road. On this basis, the QIA indicated that they expected that once the plans for the Tote Road improvements, expected to be carried out in 2017, are finalized and presented, the QIA would anticipate that a further update to the financial security estimate may be required.

A comparison of the QIA and BIMC estimates suggests that some of the main factors contributing to the differences in the estimates were as follows:

- Higher marginal direct cost generally, as determined by the QIA, for:
    - Grading and re-contouring; and
    - Unidentified high priority disturbed areas along the Tote Road;
    - Mobile equipment owned by BIMC;
- Indirect cost differences;
- Higher marginal indirect associated with mobilization and demobilization of third Party; and
- Inclusion of cost adjustments to reflect inflation (1.0254).

December 5, 2016 Submission

On December 5, 2016, the QIA provided an update to its comprehensive Security Estimate of December 2, 2016. The QIA's December 5, 2016 updated estimate included changes of approximately $144,000 in direct costs and $83,000 in indirect cost to reconcile line items associated with a truck wash building that was not constructed in 2014. The reconciliation resulted in a reduction to the QIA's previous financial security estimate, reducing the total from **$56,317,000** to **$56,085,000**.

2017 ASR Teleconference Speaking Notes

Following the teleconference held in support of the 2017 ASR Process on December 9, 2016, the QIA submitted a copy of the QIA's speaking notes for the Board's consideration. The speaking notes restated that it was the QIA's position that the reclamation estimate as revised on December

5, 2016 of **$56,085,000**, reflected the total reclamation amount associated with the Project on Inuit Owned Lands as proposed in the 2017 Work Plan and 2017 Work Plan Addendum. In addition, the speaking notes included information about the methodology used by the QIA to obtain its estimate as well as issues remaining outstanding. Further, the notes indicated that the QIA did not consider it necessary to take into account the reclamation security posted by BIMC for the Type "B" Water Licence. In addition, the QIA's notes reiterated that the QIA plans to re-examine the financial security upon BIMC's submission of details regarding the Tote Road Earthworks Execution Plan.

The QIA also highlighted that it had received additional information and clarification from BIMC regarding certain aspects of the 2017 Work Plan that could have a bearing on the QIA's initial estimate, and that further discussions with BIMC on several topics in the 2017 Work Plan were planned for January that may also result in changes to the QIA's initial estimate. The QIA stated that similar to previous years, differences remain between the QIA's and BIMC's estimates regarding the demobilization of third-party equipment from the site at the time of closure.

December 12, 2016 Submission

On December 12, 2016, the NWB received from the QIA, a copy of correspondence sent to BIMC regarding *Financial Security Assessment, Inflation, and Joint Submission* to the NWB. In its correspondence, the QIA indicated that while it may not be reasonable to have a discussion of alternatives in respect of including a factor for inflation at this stage in the 2017 ASR Process, the QIA indicated a willingness to engage with BIMC on this subject following the posting of security for the 2017-2018 period. In addition, the QIA mentioned in its submission that the NWB would be provided with additional correspondence on a subsequent date regarding whether or not a BIMC–QIA joint submission will be provided.

INAC MAJOR SUBMISSIONS

As one of the main stakeholder in the process, INAC provided the following key submissions, which are summarized in the following sections:

- Comprehensive Review
- December 16, 2016 Submission

December 2, 2016 Submission

INAC indicated in its comprehensive Security Review for the Project, which was received on December 2, 2016, that it considered several documents, including BIMC's 2017 Work Plan and associated documents to update INAC's global security amount for the Project. INAC estimated the security for reclamation on Crown Lands would be **$1,298,555** and for Inuit-owned Land would be **$48,633,568**. INAC mentioned in its submission that although the INAC updated reclamation security estimate for Crown Lands was higher than the amount of security currently held under the Water Licence ($1,210,000), as it was INAC's view that any change to this amount should trigger an amendment to the Water Licence, INAC was content for the security amount to be held for Crown Land to remain unchanged at **$1,210,000**.

As with INAC's submissions in previous ASR Processes, INAC also continued to raise concerns that the full amount of reclamation security necessary to ensure reclamation of water on both Crown Lands and Inuit Owned Lands was not held under the Water Licence. INAC's concerns relate to the potential for differences in the way security is held and administered under the Water

Licence and under the commercial lease could result in INAC being required to assume responsibility for reclamation of the Project's impacts on water without access to the security held under the commercial lease by the QIA.

The differences between INAC's global financial security estimate and BIMC's global financial security estimate were mostly attributed to: a bonding factor (2%) included in INAC's estimate; and direct and indirect cost assignment in the method used to calculate the reclamation security. INAC used the most recent RECLAIM 7 model while BIMC used a method called the Estimate Breakdown Structure (EBS).

December 16, 2016 Submission

Following the ASR Teleconference held on December 9, 2016, on December 16, 2016, INAC submitted final recommendations regarding the 2017 ASR Process and updated reclamation cost estimate.

INAC's December 16, 2016 submission included comments on works or activities included in BIMC's 2017 Work Plan. In addition, INAC commented further on the issue of the total amount of reclamation security for water on both Crown Land and Inuit Owned Lands not being held by the Minister under the Water Licence, noting that this has been the case since the Licence was issued. Further, INAC changed the position stated in INAC's December 2, 2016 submission by stating that the security that BIMC should be required to post under the Water Licence for the 2017-2018 period should be increased to **$1,298,555** rather than remain at the **$1,210,000** currently held by the Minister under the Water Licence.

BIMC – QIA JOINT SUBMISSION

On January 6, 2017, BIMC provided a joint submission developed by the QIA and BIMC in support of the 2017 ASR Process for the Mary River Project. The joint submission was the result of discussions that occurred between BIMC and the QIA following the December 9, 2016 ASR Teleconference.

The joint submission indicated that, subject to further discussion between the parties, the overall reclamation security proposed by both parties for the 2017-2018 period under the commercial lease is $**51,384,000**. The joint submission did not address the security that should be held under the Water Licence.

SUMMARY OF RECLAMATION ESTIMATES PROVIDED BY ALL PARTIES

Table 1 that follows summarizes the proposed reclamation estimates provided by the various parties initially and finally during the 2017 ASR Process, for the 2017 – 2018 period, as detailed in the previous sections of this letter.

Table 1: Security Proposed in Various Parties Submission for the 2017 – 2018 Period

Party -Submission	Water Licence ($)	Commercial Lease ($)	Total($)
QIA – Initial	N/A	56,317,000	**56,317,000**
QIA – Final	N/A	56,085,000	**56,085,000**
BIMC – Initial	1,210,000	46,935,000	**48,145,000**
BIMC – Final	1,199,000	48,072,000	**49,271,000**
INAC – Initial	1,210,000	48,633,568	**49,843,568**
INAC – Final	1,298,555	48,633,568	**49,932,123**
BIMC – QIA (Jointly)	N/A	51,384,000	**51,384,000**

The Updated Global Security Amount for 2017-2018

The Board recognizes that there are still some differences of opinion with respect to assumptions underlying the development of the global security amount for reclamation of the undertaking. Issues such as the addition of a rider for inflation, the use of unit prices based on models versus actual contract prices, etc. However, after reviewing all submissions received, the 2017 Work Plan and the estimates as proposed and revised as part of the 2017 ASR Process, the Board is confident that the global security amount should be increased to **$52,682,555**. This amount reflects security in the amount of **$51,384,000** being held by the QIA under the commercial lease (as proposed jointly by BIMC and the QIA in the January 6, 2017 submission) and an increase of **$88,555** to the security held under the Water Licence to **$1,298,555.** The increase to the security under the Water Licence was stated by INAC to be required to reflect an increase in the liability associated with the Project components on Crown Land. In the Board's view the increased global security amount of **$52,682,555**, is equal to the highest reclamation liability for land and water combined for the upcoming period of March 2017 to March 2018 and will be sufficient to cover previous activities and activities proposed for this period under the 2017 Work Plan and the 2017 Work Plan Addendum.

The Amount of Security Required by the NWB to be posted under Licence #2AM-MRY1325 for the 2017-2018 Period

As outlined in the preceding section, the Board has determined that there should be an increase in reclamation security held by the Minister under Part C, Item 1 from the amount currently held of **$1,210,000 to $1,298,555.** It is the Board's view that this increase is required to reflect the increased Project liability on Crown Lands. It should also be noted that BIMC did not address INAC's submissions on the slight increase requested for the upcoming year. The Board finds that the increase requested is reasonable in the circumstances, and should be granted to ensure that the reclamation security for the undertaking under all instruments is sufficient. As outlined in the

Water Licence, the security posted under the Water Licence must be held in the form required under the *Nunavut Waters Regulations* and acceptable to the Minister of INAC.

Summary of Total Security for the Project Pursuant to Part C & Schedule C of Licence 2AM-MRY1325 for 2013 -2018

The following graphs and figures shows the global security amount as determined by the Board for the Project for specific years over the period of the 2nd 2013 to the 1st quarter of 2018, inclusively.

Table 2: Global Security Associated with the Mary River Project, 2013 – 2018

Year	**2rd Qtr. 2013 - 1st Qtr. 2017** With Licence Issuance	**1st Qtr. 2014 – 1st Qtr. 2015** (Based on 1st ASR	**1st Qtr. 2015 – 1st Qtr. 2016** Based on 2nd ASR	**1st Qtr. 2016 – 1st Qtr. 2017** (Based on 3rd ASR	**1st Qtr. 2017 – 1st Qtr. 2018** Based on 4th ASR
Total ($)	36 Million	39.959 Million	47.6835 Million	50.0555 Million	52.682555 Million

Figure 1: Graph Showing Reclamation Security Required to Be Posted Annually for the Mary River Project, 2013 – 2018

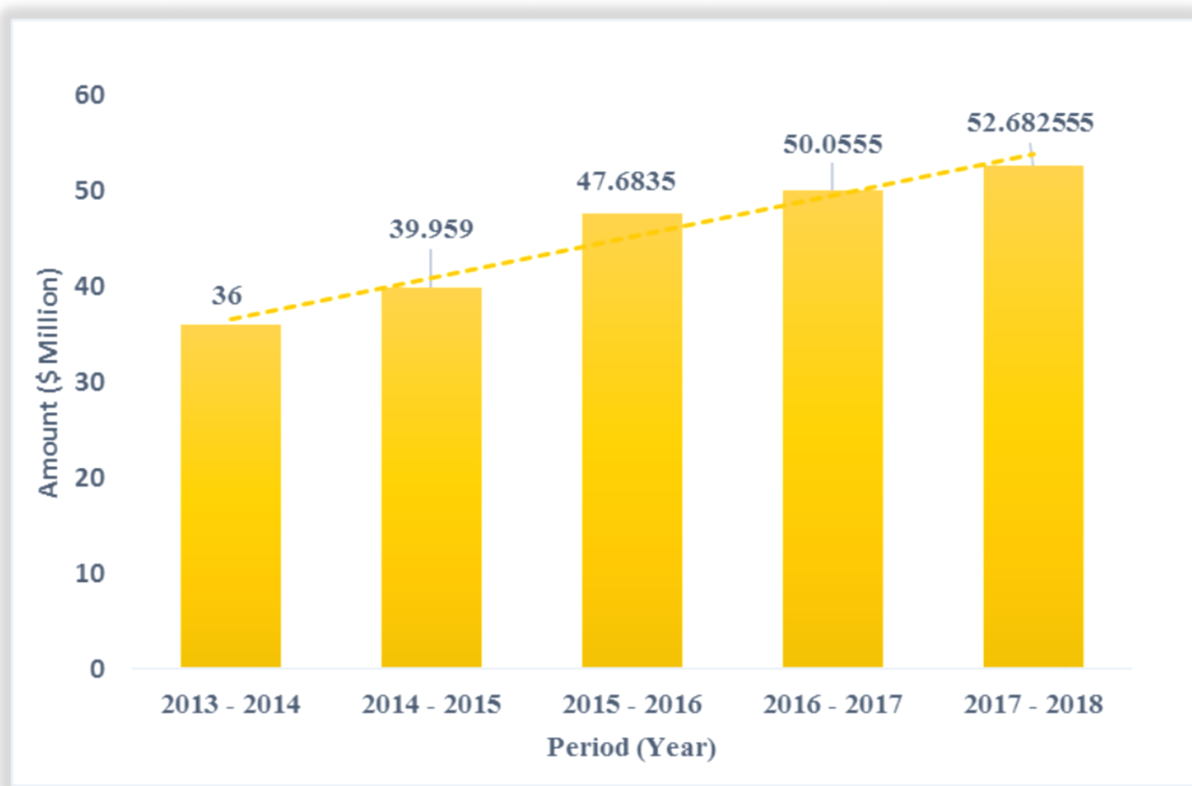
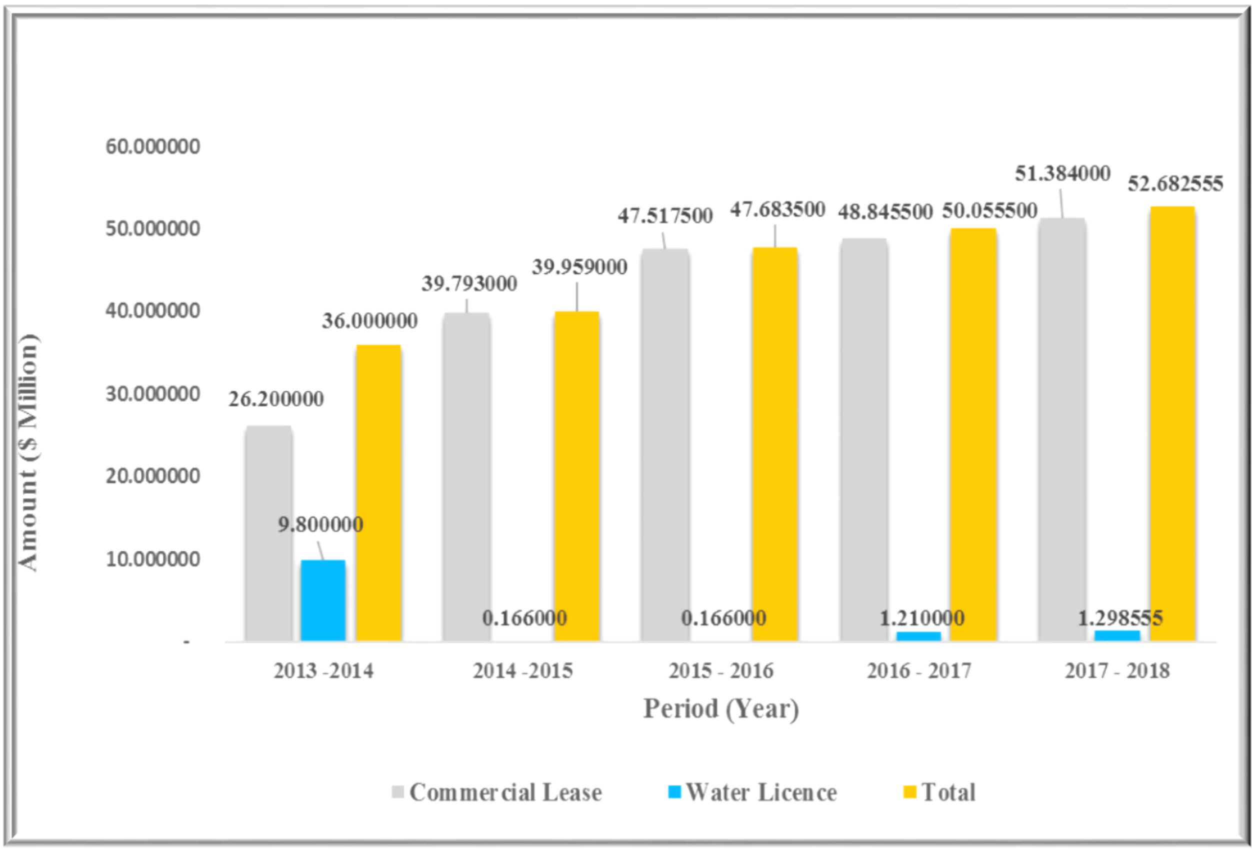


Table 3: Summary of the Apportionment of the Global Security Amount Held Under the Commercial Lease and the Water Licence for the Period 2013 – 2018

Instrument	*2013 - 2014*	*2014 - 2015*	*2015 - 2016*	*2016 -2017*	*2017 - 2018*
Commercial Lease	$26,200,000	$39,793,000	$47,517,500	$48,845,500	51,384,000
Water Licence	$9,800,000	$166,000	$166,000	$1,210,000	1,298,555
Total	**$36,000,000**	**$39,959,000**	**$47,683,500**	**$50,055,500**	**52,682,555**

Figure 2: Relative Proportion of Security Held under the Commercial Lease and Water Licence for the Period 2013 - 2018



Closure of the 2017 ASR Process

This concludes the Board's ASR determination with respect to the global security amount and the updated security required to be held under Part C, Item 1 and Schedule C of Licence No. 2AM-MRY1325 for the 2017-2018 season, as specified under the Licence, Schedule C, Item 4. During the 2017 ASR Process, the Licensee agreed to furnish the financial security as set out in this determination within thirty (30) days from the date of receipt of this decision. The Board expects that confirmation of the additional security that has been filed with the QIA will be provided to the Board when that process is completed. All parties are advised that if confirmation of security being in force is not received by March 1, 2017 the Board may take further steps and issue further written direction under the ASR Process to ensure that adequate security is in place prior to the commencement of work under the 2017 Work Plan.

If you have any questions or require further direction with respect to this matter, please contact the Board's Executive Director, Stephanie Autut at (867) 360-6338, ext: 22 or via e-mail: stephanie.autut@nwb-oen.ca or Director of Technical Services, David Hohnstein at his direct line (780) 443-4406 or via e-mail: david.hohnstein@nwb-oen.ca.

Regards,

Thomas Kabloona
Chairperson
Nunavut Water Board

cc. Public Registry
Stephen Williamson Bathory (QIA)
Karen Costello (INAC)
Mary River Distribution List

TABLE 1:
List of Key Documentation and Activities in Support of the 2017 ASR

Date	Activity
October 5, 2016	NWB issued guidance regarding the process and schedule for the 2016 – 2017 ASR and invited comments from the parties
October 31, 2016	NWB received and distributed BIMC's correspondence indicating that there would be a delay in submission of the 2017 Work Plan (revised submission date November 4, 2016)
November 1, 2016	NWB issued correspondence that included a revised process schedule for the 2017 ASR Process to reflect the delay in BIMC's filing of the 2017 Work Plan and requested revisions from INAC and the QIA
November 3, 2016	NWB received and distributed a submission from INAC that included: • A cover letter, dated November 3, 2016, outlining the amount of reclamation security currently held by the Minister under the Water Licence and INAC's planned involvement in the upcoming ASR Process; and • A copy of INAC's Annual Geotechnical Site Inspection Report for the Mary River Project (2016), produced by SNC Lavalin Inc.
November 3, 2016	NWB received and distributed a submission from the QIA that included the following documents: • A cover letter regarding QIA's intended participation in the 2017 ASR Process; and • A copy of a standby letter of credit, in the amount of $48.5455 million, issued June 17, 2016, by the Bank of Nova Scotia
November 4, 2016	NWB received and distributed BIMC's 2017 Work Plan
November 24, 2016	NWB received and distributed BIMC's submission regarding the 2017 Marginal Closure and Reclamation Security Estimate Revisions that reflected BIMC's response to interested parties' feedback
December 2, 2016	NWB received and distributed the QIA's submission reviewing the reclamation security proposed for the 2017 period that included: • A cover letter that addressed a number of topics including the reclamation security requirements under both the BIMC-QIA commercial lease and the Water Licence; and • A copy of QIA's Comprehensive Security Estimate, conducted by Arktis Solutions Inc., and dated November 30, 2016
December 2, 2016	NWB received and distributed INAC's submission reviewing the reclamation security proposed to be posted by BIMC for the 2017 period that included: • A cover letter regarding INAC's submission and other topics; and

Date	Activity
	• A copy of INAC's review conducted by SNC Lavalin Inc., and dated December 1, 2016
December 5, 2016	NWB received correspondence from the QIA regarding the Draft Agenda for the December 9, 2016 ASR Teleconference and confirmation of the QIA's intention to participate in the teleconference
December 5, 2016	NWB received and distributed QIA's comprehensive security estimate addendum, dated December 5, 2016
December 6, 2017	NWB received and distributed BIMC's response to the QIA and INAC's December 2, 2016 submissions
December 6, 2017	NWB received correspondence from INAC regarding the Draft Agenda for the December 9, 2016 ASR teleconference and confirmation of INAC's intention to participate
December 7, 2016	NWB Distributed the finalized Agenda and details regarding confirmed participants, BIMC, QIA, and INAC, for the ASR Teleconference scheduled for December 9. 2016
December 8, 2016	NWB received and distributed a copy of BIMC's ASR presentation
December 9, 2016	NWB hosted the 2016 – 2017 ASR Teleconference, representatives from BIMC, INAC and the QIA participated
December 9, 2016	NWB received the QIA's Speaking notes related to the ASR teleconference
December 12, 2016	NWB received and distributed ECCC Fisheries Act direction and INAC Letter of Non-Compliance dated September 2016
December 12, 2016	NWB received and distributed a submission from the QIA regarding the QIA's financial security assessment, inflation, and a joint submission to the NWB
December 12, 2016	NWB received and distributed the following Documents: • BIMC Construction Summary Report Addendum: Milne Port Stockpile Settling Ponds dated September 27, 2016; and • Mine Haul Road Drainage improvement Project, Phase 1 Construction As-Built Report dated August 29, 2016
December 14, 2016	NWB received and distributed correspondence from BIMC providing a response to the QIA's December 12, 2016 correspondence
December 16 2016	NWB received and distributed correspondence from INAC regarding INAC's final recommendations for the 2017 ASR Process
December 19, 2016	NWB received an email notification from BIMC indicating that the QIA and BIMC were continuing to work together with a view to providing a joint submission to the NWB for consideration during the ASR Process and identifying that BIMC would follow up with the Board by December 23 to indicate whether a joint submission would be provided by QIA and BIMC during the ASR Process
December 23, 2016	NWB received correspondence from BIMC confirming that BIMC and the QIA would be providing a joint submission by January 2, 2017
January 2, 2017	NWB received correspondence from BIMC indicating that the joint submission with the QIA would be delayed due to BIMC's internal approval process

Date	Activity
January 2, 2017	NWB distributed post-teleconference follow-up correspondence from BIMC, dated December 23, 2016 (received after the NWB office closed on December 23, 2016).
January 6, 2017	NWB received a joint submission from BIMC and the QIA

Project Report
Date: 2 November 2016

2017 Marginal Closure and Reclamation Financial Security Estimate

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1. Introduction

1.1 Purpose

The purpose of the 2017 Marginal Closure and Reclamation Financial Security Estimate ('2017/18 ASR Estimate') is to provide a summary of the closure and reclamation security estimated to be required for the Mary River Project (the Project) to meet reclamation objectives as outlined in the Interim Mine Closure and Reclamation Plan (BAF-PH1-830-P16-0012). The total 'global' closure and reclamation security estimated to be required takes into consideration planned work in 2017/18 being conducted under Type "A" Water Licence 2AM-MRY1325, Amendment No. 1 and the Qikiqtani Inuit Association's (QIA) Commercial Lease No. Q13C301 in addition to previous Project closure and reclamation security.

The 2017/18 ASR Estimate is intended to be inclusive of all closure and reclamation costs estimated to be required for a 3rd Party Contractor to perform the work in a 'worst-case' scenario for all disturbed areas, project components and project activities existing on the Mary River Project site upon conclusion of the 2017 Work Plan. For the purpose of this document, the material changes associated to security from the 2017 Work Plan are termed, '2017 Work Plan Security Estimate'.

In order for the 2017/18 ASR Estimate to accurately reflect the total 'global' closure and reclamation security estimated to be required for the Project in 2017/18, this document also provides a summary of the identified Project components and activities that have materially changed from the position presented by Baffinland Iron Mines Corporation (Baffinland) during the 2016/17 Annual Security Review (ASR)[1]. Based on these identified material changes, the resulting associated security impacts (+/- $) are also presented for incorporation into the 2017/18 ASR Estimate to ensure accurate representation of the Project based on current planning. For the purpose of this document, this process was termed the '2016/17 ASR Reconciliation'. The combination of the 2016/17 ASR Reconciliation and 2017 Work Plan Security Estimate form the 2017/18 ASR Estimate.

1.2 Regulatory Context

An annual adjustment to reclamation security is required under Section 9.2 of the Commercial Lease, No. Q13C301, agreed to between Baffinland and the QIA, as well as a requirement under the Type 'A' Water Licence 2AM-MRY1325, Amendment No. 1 (Part J, Item 3). The 2017/18 ASR Estimate therefore represents Baffinland's proposed annual adjustment to reclamation security to account for work conducted on site to date and planned work to be completed as described in the 2017 Work Plan.

[1] As described in 2016 Marginal Closure and Reclamation Financial Security Estimate (H349001-1000-07-126-0002, Rev 0) and NWB Letter on February 5, 2016 Re: Licence No. 2AM-MRY1325, Baffinland Iron Mines Corporation Type "A" Water Licence, Mary River Mine Project: Direction from Nunavut Water Board Under the Annual Security Review Process Established Under Part C and Schedule C of the Water Licence.

The 2017/18 ASR Estimate has been developed in accordance with conditions outlined within Section 9.2 of the Commercial Lease; conditions outlined within Type “A” Water Licence 2AM-MRY1325, Amendment No. 1, Part J, Item 3 and Schedule J; and in consideration of the QIA Abandonment and Reclamation (A&R) Policy (QIA, 2013). The amount of security estimated to be required is based on an estimate of the highest reclamation liability in the upcoming year[2] or ‘worst case’ scenario.

1.3 Applied Rates

The 2017/18 ASR Estimate was developed by applying the direct cost unit rates established in the 2014 Complete Project Financial Security Assessment[3] to quantities of functional units of each activity or project component proposed/changed under the 2017/18 ASR Estimate unless indicated otherwise. Based on the direct cost estimate, indirect costs required to support direct cost work were accounted for proportional to assumptions and considerations applied in the 2014 Complete Project Financial Security Assessment. Indirect costs are additional costs outside of costs required for direct reclamation activities that are required to ensure reclamation objectives are met. The sum of direct and indirect estimated costs for the 2017/18 ASR Estimate was then differentiated based on geographic liability allocation (IOL vs. Crown land) and relation to land or water liability. Appendix A presents the Mary River Project Estimate Breakdown Structure (EBS) which demonstrates the results of this process for all activities or project components proposed under the 2017/18 ASR Estimate and all previous project financial security liabilities as described in previous ASR submissions.

All costs in Canadian Dollars (CAD). All monetary totals rounded to nearest ’000.

1.4 Document Structure

The following outlines the structure of the 2017/18 ASR Estimate document:

- Section 1 presents the purpose, regulatory context, applied rates used, and document structure applicable to the 2017/18 ASR Estimate;
- Section 2 describes the ‘2016/17 ASR Reconciliation’ process, and its resulting impacts to the 2017/18 ASR Estimate;
- Section **Error! Reference source not found.** provides a summary of the financial security estimated to be required for marginal closure and reclamation liability increase associated with the Mary River Project 2017 Work Plan (‘2017 Work Plan Security Estimate’);
- Section 4 summarizes net impacts to the 2017/18 ASR Estimate associated with 2016/17 ASR Reconciliation and 2017 Work Plan Security Estimate; and
- Section 5 lists supporting documentation that was used to determine costs and quantities for the purpose of the 2017/18 ASR Estimate.

[2] As per Type ‘A’ Water Licence 2AM-MRY1325, Amendment No. 1, Schedule C, Part 6, Item c.

[3] As described in 2014 Complete Project Financial Security Assessment, H349000-1000-07-126-0018, Rev.1. Hatch. Submitted to parties October 31, 2014.

2. 2016/17 ASR Reconciliation

In order for the 2017/18 ASR Estimate to accurately reflect the total 'global' closure and reclamation security estimated to be required for the Project in 2017/18, a 2016 Annual Security Audit of the Project sites was conducted September 14 to 21, 2016 by Baffinland and QIA representatives. The purpose of the 2016 Annual Security Audit was to identify Project components and activities that have materially changed from the position presented by Baffinland during the 2016/17 ASR. Based on these identified material changes, the resulting associated security impacts (+/- $) were determined, which are presented below for proposed incorporation into the 2017/18 ASR Estimate to ensure accurate representation of the Project based on current planning.

The nature of the changes found during the 2016/17 ASR Reconciliation process primarily relate the removal of the direct and indirect cost allocations captured in the position presented by Baffinland during the 2016/17 ASR related to components or activities that, due to changes in project planning, have not occurred to-date and are not anticipated to occur in 2017/18 or have been superseded by a more current/accurate allocation. The items to be removed from the 2017/18 ASR Estimate due to the 2016/17 ASR Reconciliation process primarily relate to borrow and quarry areas.

An itemized list of the of cost allocations that were removed, added and/or modified is presented in sub-section 2.1.

2.1 Direct Cost Items Removed from Estimate

This sub-section describes the changes to direct cost assumptions/quantities proposed to be captured by the 2017/18 ASR Estimate based on the results of the 2016/17 ASR Reconciliation.

Identified changes resulted in credit or removal of direct costs items allocated in previous ASR estimates that due to changes in project planning, have not occurred to-date and are not anticipated to occur in 2017/18.

2.1.1 Grade and Re-Contour

The position presented by Baffinland during the 2016/17 ASR allocated a total of $185,000 in direct costs to account for grading and re-contouring of disturbed areas that have not been disturbed and are not anticipated to be disturbed related to the Mary River Project. An itemized list of this reduction is presented in Table 2-1. For the purpose the 2017/18 ASR Estimate, these areas are no longer envisioned as requiring grading and re-contouring or have been superseded by a more current/accurate allocation.

Table 2-1. Disturbed Areas Removed from the EBS

Description	Unit Rate ($)	Quantity (m^2)	Total Cost ($)[1]
Grade and Contour			
Q9 Quarry	1.81	15,166	27,450
Q14 Quarry	1.81	13,440	24,326
Q15 Quarry	1.81	10,680	19,331
P5 Borrow Source	1.81	4,600	8,326
P6 Borrow Source	1.81	7,500	13,575
P7 Borrow Source	1.81	8,100	14,661
P8 Borrow Source	1.81	8,385	15,177

Description	Unit Rate ($)	Quantity (m^2)	Total Cost ($)[1]
P10 Borrow Source	1.81	19,344	35,013
P13 Borrow Source	1.81	8,456	15,305
P14 Borrow Source	1.81	3,160	5,720
P15 Borrow Source	1.81	3,300	5,973
TOTAL		**102,131**	**185,000**

NOTES:
1) Grand total rounded to nearest '000

3. 2017 Work Plan

3.1 Introduction

The purpose of this section of the document is to provide a summary of the additional financial security estimated to be required for work items described in the Mary River Project 2017 Work Plan (November 4, 2016). The estimated marginal closure and reclamation financial security required to account for 2017 planned work (aka. The '2017 Work Plan Security Estimate') is intended to be aggregated with the results of the 2016/17 ASR Reconciliation process (described in Section 2) and previous Project closure and reclamation security bonding. The combination of the 2016/17 ASR Reconciliation results and the 2017 Work Plan Security Estimate form the basis of the 2017/18 ASR Estimate. The result of this approach, the estimated project-wide or 'global' closure and reclamation security bonding totals for the Mary River Project to-date, are presented in Section 4.

A detailed description of the work activities captured in the 2017 Work Plan Security Estimate are described in the Baffinland 2017 Work Plan and are summarized in Section 3.2 below.

3.1.1 Closure Scenario

The 2017 Work Plan Security Estimate is based on a scenario that assumes all planned activities for 2017 Work Plan have taken place on site and all material/consumables (excluding fuel) that are mobilized to site in 2016 are in full inventory. All other assumptions relating to the estimation of direct and indirect, including fuel, associated with the 2017 Work Plan Security Estimate are consistent with rates and assumptions established in the 2014 Complete Project Financial Security Assessment and previous ASR documentation unless noted otherwise.

3.2 2017 Planned Activities

As described in the 2017 Work Plan, planned work in 2017/18 is being conducted under the amended Project Certificate No.005, QIA Commercial Lease No. Q13C301, Type 'A' Water Licence 2AM-MRY1325, Amendment No. 1 and Type 'B' Water Licence 8BC-MRY1416. Planned work includes:

- Development and operation of the mine, ore crushing and land transportation, stockpiling and marine shipment of ore.
- The continued development and construction of infrastructure required at Milne Port and the Mary River Mine Site (Mine Site) and along the Tote Road for the Mary River Project.
- Mobilization of additional 49 person soft-wall camp at Milne Port and continued operation of Mine Site and Milne Port Camps to support ongoing operations and construction

activities which will include the use of water and deposition of waste as authorized under existing permits.

- On-going operation of permitted quarry and borrow sources; there are also additional planned quarries or borrow areas along the Tote Road that are identified and are to be utilized during 2017.
- At Milne Port, vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port will arrive during open water (approximately between mid-July and mid-October 2017). Material, fuel and supplies required for operational and construction activities will be transported to the Mine Site year round via the Tote Road.
- Geotechnical drilling may be required to support engineering, design and construction activities of Project.
- Ongoing environmental effects studies and baseline data collection will continue to support the construction and operation of the Project as well as for future engineering requirements.
- Continued environmental monitoring in accordance with the approved Project Certificate, licenses, authorizations, management plans and environmental effects monitoring plans.
- On-going exploration activities including mapping, prospecting, sampling, and geophysics. There is the potential for a drilling and/or trenching program but these items are not yet finalized.

A detailed description of these work activities, which are captured in the 2017 Work Plan Security Estimate, are described in the Baffinland 2017 Work Plan.

3.3 2017 Work Plan Security Estimate Assumptions

3.3.1 Direct Cost Assumptions

The following sections describe the assumptions used to establish the direct costs allocated in the 2017 Work Plan Security Estimate based on the 2017 Work Plan. Please refer to Appendix A for details of this cost allocation based on the EBS Breakdown Structure, Appendix B for locations of below noted facilities, and Appendix C for supporting documentation relating to estimated unit quantities (where available). Direct cost allocations were applied to quantities as indicated in the 2017 Work Plan and consistent with the direct cost assumptions described in the 2014 Complete Project Financial Security Assessment.

3.3.1.1 Buildings and Foundations

The 2017 Work Plan Security Estimate allocates $331,000, plus proportional cover material application costs, in direct costs to account for a marginal increase of buildings and foundations associated with the 2017 Work Plan. This marginal increase of buildings and foundations is itemized in the EBS as presented in Appendix A. This additional cost allocation is based on:

- Mobilization and deployment of 49-person soft-wall camp at Milne Port at an assumed footprint of 950 m^2.

- Assembly of a tire shop at the Mine Site using sea can construction at the assume dimensions of 25m x 20m.
- Development of an additional Truck Wash Building at the Mine Site using fold away type construction (contaminated), precast foundations with gravel base, and an assumed footprint of 1500 m^2.

A summary of security costs associated with the marginal increase of buildings and foundations associated with the 2017 Work Plan is shown in Table 3-1.

Table 3-1: Summary of Marginal Increase of Buildings and Foundation Areas with Associated Unit Rates

Description	Unit Rate Type	Unit Rate ($)	Quantity (m^2)	Cost ($)[1]
49 Person Camp at Milne Port	Soft Walled Building (tent) Not Contaminated	47.51	950	45,135
Assembly of a tire shop at Mine Site	ISO Container	29.69	500	14,845
Additional Truck Wash Building at Mine Site	Fold-Away Building (Contaminated)	142.41	1,500	213,615
Additional Truck Wash Building at Mine Site	Pre-cast Foundations	38.47	1,500	57,705
		TOTAL	**4,450**	**331,000**

NOTES:
1) Grand total rounded to nearest '000

3.3.1.2 Mechanical and Mobile Equipment

The 2017 Work Plan Security Estimate allocates $475,000, plus cover material application costs, in direct costs to account for a marginal increase of mechanical and mobile equipment as itemized in the 2017 Work Plan. This cost allocation is based on an additional 105 pieces of mechanical or mobile equipment mobilized to site in 2017 and the addition to three (3) pieces of 'Heavy Mobile Equipment', owned by 3rd Party, to align with the 'Typical' 3rd Party equipment fleet recommended to be adopted by Hatch and Arktis in Mary River Financial Security Estimate – Preliminary Path Forward on Items with High Uncertainty, H349000-1000-07-220-0005, Revision 2.

It is noted detailed design for the additional 'cross-conveyor' being constructed in 2017 at Milne Port has yet to be completed. Therefore for the purpose of the 2017 Work Plan Security Estimate, it was assumed the cross-conveyor is one sixth the length of the existing reclaim ship loader conveyor at Milne Port at the prorated version of the same unit rate.

A summary of the marginal increase of costs associated with mechanical or mobile equipment and associated unit rates is shown in Table 3-2.

Table 3-2: Summary of Marginal Increase of Mechanical and Mobile Equipment with Associated Unit Rates

Description	Unit Rate Type	Unit Rate ($/pcs)	Quantity (pcs)	Cost ($)[1]
Truck Wash System for New Truck Wash Building	Medium Mechanical Equipment	4,261.34	1	4,261
Grader	Heavy Mobile Equipment	2,618.87	1	2,619
777 Haul Truck	Heavy Mobile Equipment	2,618.87	1	2,619
D10 Dozer	Heavy Mobile Equipment	2,618.87	1	2,619

Description	Unit Rate Type	Unit Rate ($/pcs)	Quantity (pcs)	Cost ($)[1]
Ore Haul Trucks	Heavy Mobile Equipment	2,618.87	8	20,951
Ore Haul Truck B-Train Trailer	Medium Mobile Equipment	1,494.13	8	11,953
Fuel/Lube Truck	Heavy Mobile Equipment	2,618.87	1	2,619
Forklift	Medium Mobile Equipment	1,494.13	2	2,988
Telehandler	Heavy Mobile Equipment	2,618.87	1	2,619
Mechanics Truck (with crane and compressor)	Medium Mobile Equipment	1,494.13	1	1,494
Passenger Bus	Medium Mobile Equipment	1,494.13	1	1,494
Feeder (small)	Medium Mechanical Equipment	4,261.34	3	12,784
Jump Conveyor	Medium Mechanical Equipment	4,261.34	12	51,136
Cross Conveyor	Reclaim Conveyor	1,329,441.31	0.17 (1 psc)	221,574
Screener	Medium Mechanical Equipment	4,261.34	1	4,261
992 Loader	Heavy Mobile Equipment	2,618.87	4	10,475
Cone Crusher	Medium Mechanical Equipment	4,261.34	1	4,261
Zoom Boom	Heavy Mobile Equipment	2,618.87	1	2,619
Excavators	Heavy Mobile Equipment	2,618.87	2	5,238
Chain Conveyor	Medium Mechanical Equipment	4,261.34	2	8,523
Pick Up Truck	Light Mobile Equipment	941.09	12	11,293
Frost Fighter	Light Mechanical Equipment	1,980.80	20	39,616
Light Plant	Light Mechanical Equipment	1,980.80	20	39,616
3rd Party Heavy Mobile Equipment (make up for 'typical' fleet)	Light Mechanical Equipment	2,618.87	3	7,857
		TOTAL	**108**	**475,000**

NOTES:
1) Grand total rounded to nearest '000

Refer to Appendix A for an item by item breakdown of the allocation of direct cost relating to mechanical or mobile equipment reclamation.

3.3.1.3 *Cabling*

The 2017 Work Plan Security Estimate allocates $185,000 to account for additional cabling and lighting being constructed in 2017 at Milne Port and the Mine Site. This cost allocation is based on the assumption 3.5 km of cabling/lighting will be installed at Milne Port and 3.5 km of cabling/lighting will be installed at Mine Site for safety purposes. A summary of the marginal increase of cabling in the 2017 Work Plan Security Estimate is shown in Table 3-3.

Table 3-3: Summary of Marginal Increase of Site Works with Associated Unit Rates

Description	Unit Rate Type	Unit Rate ($/m)	Quantity (m)	Cost ($)[1]
Lighting and Cabling at Mine Site	Cable	$26.49	3,500	92,715
Lighting and Cabling at Milne Port	Cable	$26.49	3,500	92,715
		TOTAL	**7000**	**185,000**

NOTES:
1) Grand total rounded to nearest '000

3.3.1.4 Consumables

The position presented by Baffinland during the 2016/17 ASR directly assigned costs for reclamation activities associated with disposal of consumables stored on-site in relation to the Project. Although by definition consumables are a commodity that is intended to be used up relatively quickly, for the purpose of accounting for the 'worst case' scenario for the Project it was determined that a total of $700.80 per bed space available on site be allocated to account for consumable removal and reclamation during closure activities. This cost is inclusive of:

- Disassembly (if required), load, transport of consumables – $577.99/bed space;
- Fill application for additional compacted volume of material requiring disposal on-site – $67.20/bed space;
- Mobilization/demobilization of workers required for the task – $14.87/bed space; and
- Worker accommodation and camp operation – $40.74/bed space.

Allocation also includes Mobilization and Demobilization of Equipment and Materials by Sealift (+10%), Contingency (+12.5%) and Supervision, Project Management & Contract Administration (+9.4%) as these are applied as part of the multiplier application to total direct costs. A summary of the marginal increase of consumables in the 2017 Work Plan Security Estimate is shown in Table 3-4.

Table 3-4: Summary of Marginal Increase of Consumables with Associated Unit Rates

Description	Unit Rate Type	Unit Rate ($/ea)	Quantity (ea)	Cost ($)[1]
Additional 49 Bed Spaces	Consumables	$700.80	49	34,339.20
		TOTAL	**49**	**34,000**

3.3.1.5 Site Works

The 2017 Work Plan Security Estimate allocates $280,000 to account for application of cover material due to the marginal increase of demolition materials to be disposed of on-site and reclamation of additional disturbed areas. A summary of the marginal increase of these "Site Works" in the 2017 Work Plan Security Estimate is shown in Table 3-5.

Table 3-5: Summary of Marginal Increase of Site Works with Associated Unit Rates

Description	Unit Rate Type	Unit Rate ($/m^2)	Quantity (m^2)	Cost ($)[1]
2017 Work Plan Demolition Materials	Fill Application	44.37	1,095	48,585
Q1 Quarry (marginal increase to existing)	Grade and Re-Contour	1.81	6,000	10,860
Q7 Quarry	Grade and Re-Contour	1.81	2,000	3,620
Q11 Quarry	Grade and Re-Contour	1.81	2,000	3,620
Q18 Quarry	Grade and Re-Contour	1.81	2,000	3,620
QMR2 (marginal increase to existing)	Grade and Re-Contour	1.81	6,000	10,860
Km 2 Borrow Source (marginal increase to existing)	Grade and Re-Contour	1.81	1,000	1,810
Km 97 Borrow Source (marginal increase to existing)	Grade and Re-Contour	1.81	1,000	1,810
Expansion of Crusher Pad Storage Area - Phase 1	Grade and Re-Contour	1.81	8,200	14,842
Expansion of Crusher Pad Storage Area - Phase 2	Grade and Re-Contour	1.81	17,500	31,675
Expansion of Ore Stockpile Storage Area - Phase 1	Grade and Re-Contour	1.81	36,900	66,789
Expansion of Ore Stockpile Storage Area - Phase 2	Grade and Re-Contour	1.81	45,100	81,631
			TOTAL	**280,000**

NOTES:

1) Grand total rounded to nearest '000

3.3.2 Indirect Cost Assumptions

The following section describes the assumptions used to establish the indirect costs allocated for the purpose of the 2017 Work Plan Security Estimate. Unless noted otherwise, see the 2014 Complete Project Financial Security Assessment (H349000-1000-07-126-0018, Rev. 1) for further supporting information on the specific indirect unit rates and multipliers used below.

3.3.2.1 On-Site Fuel Demobilization and Reclamation Fuel Mobilization

The 2017 Work Plan Security Estimate allocates an additional $28,000 to account for the mobilization of fuel required for the marginal increase in reclamation activities captured in the 2015 Work Plan Addendum.

The additional $28,000 allocation for fuel mobilization is based on the cost of mobilizing 50% of the fuel required for marginal reclamation and closure activities, including direct activities, power generation, and heat production. Direct marginal reclamation activities are estimated to require 86,136L of Type-1 fuel (see Appendix A). Marginal increases in camp operation during reclamation is estimated to require an additional 481 person-days on-site. Each person-day on site is assumed to consume 116L of Type-1 fuel for heat and power generation. Fuel mobilization rate is assumed to be $0.40/L.

See Appendix A for itemized person-day and fuel consumption quantities per 2017 Work Plan item.

3.3.2.2 Mobilization of Workers Required for Reclamation

The 2017 Work Plan Security Estimate allocates an additional $40,000 for worker mobilization. Detailed assumptions for mobilization of workers required for marginal closure and reclamation activities are:

Person-hours required to complete direct cost related on-site marginal reclamation activities is estimated to be 4,806 hrs or 481 person-days (based on 10hr/day productivity). See Appendix A for itemized person-day allocations per 2017 Work Plan item.

- Assume 70% of hires (337 person-days) are from southern communities and 30% (145 person-days) are from northern communities.
- Cost per person-day on site for worker mobilization from southern communities is $85.45/person-day on-site.
- Cost per person-day on site for worker mobilization from northern communities is $75.00/person-day on-site

3.3.2.3 Worker Accommodation & Camp Operation

The 2017 Work Plan Security Estimate allocates an additional $108,000 for worker accommodation and camp operation during marginal reclamation activities associated with the 2017 Work Plan. Assumptions for worker accommodation and camp operation are:

- Person-hours required to complete direct cost related on-site marginal reclamation activities is estimated to be 4,806 hrs or 481 person-days (based on 10hr/day productivity). See Appendix A for itemized person-day allocations.

- Cost for accommodation and camp operation is assumed to be $225.50/person-day and includes camp maintenance, catering, housekeeping, and fuel costs.

3.3.2.4 Contaminated Soil

The 2017 Work Plan Security Estimate allocates an additional $63,000 to account for on-site treatment of the marginal increase of known contaminated soil on-site. This cost is based on contaminated soil treatment unit rate of $14.78/m^3 and an assumption of an increase of 4,232 m^3 of additional contaminated soil being present at the conclusion of the 2017 Work Plan. This 4,232 m^3 of additional known contaminated soil is attributed to a Type-1 fuel release within the existing secondary containment at the Milne Port Bulk Fuel Steel Tank Farm in 2016 (Spill 16-283) and the assumption that half of the soil within the berm was contaminated to a depth of 1/3 of a meter.

3.3.2.5 Mobilization and Demobilization of Equipment and Materials

The 2017 Work Plan Security Estimate allocates an additional $117,000 to account for mobilization and demobilization of equipment and materials. These are indirect costs for moving equipment and materials to and from the reclamation site. The amount is based the assumption that mobilization and demobilization cost are estimated as 10% of total direct costs.

3.3.2.6 Supervision, Project Management and Contract Administration

The 2017 Work Plan Security Estimate includes a project supervision, management and contract administration indirect cost allowance of $116,000 or 9.4% of total direct costs, contaminated soil treatment costs, care and maintenance costs, and closure monitoring/reporting costs. Project supervision, management and contract administration indirect costs include, but are not limited to:

- Contract strategy, administration and expediting;
- Construction logistics, planning, scheduling, supervision and manpower forecasts;
- Labour relations, safety;
- Field office management, temporary facilities;
- Materials receiving and warehousing;
- Progress monitoring, trending and reporting;
- Cost performance monitoring, trending and claims processing; and
- Quality assurance.

3.3.2.7 Engineering Fees

The 2017 Work Plan Security Estimate includes an engineering, design and execution planning indirect cost allowance of $46,000 or 3.9% of the total direct costs.

3.3.2.8 Contingency

The 2017 Work Plan Security Estimate includes an additional contingency of $188,000 or 12.5% of the total of direct costs, mobilization and demobilization of equipment and materials costs, worker accommodation and camp operation costs, mobilization of workers costs, care and maintenance costs, and closure monitoring/reporting costs.

3.3.3 Exclusions

The listed activities are recognized by Baffinland as being required to be conducted in an unforeseen closure and reclamation scenario but additional costs have not been included in the 2017 Work Plan Security Estimate on the basis that it is Baffinland's position that the 2017 Work Plan Security Estimate activities do not warrant additional cost allocations for these activities. Excluded activities from the 2017 Work Plan Security Estimate are:

- Off-Site Disposal of Hazardous and Non-Hazardous Waste (including Ammonium Nitrate and explosives).
- Short-Term Care and Maintenance, Closure and Post Closure Monitoring and Reporting.

4. 2017 Marginal Reclamation and Closure Security Cost Summary

The 2017/18 ASR Estimate is inclusive of all closure and reclamation costs estimated to be required for a 3rd Party Contractor to perform the work in a 'worst-case' scenario for all disturbed areas, project components and project activities existing on the Mary River Project site upon conclusion of the 2017 Work Plan including legacy exploration phase liabilities.

Table 4-1 presents the total closure and reclamation security determined to-date (Column D) compared to the proposed adjustments to be posted as a result of the 2017/18 ASR Estimate (Column G).

Table 4-2 presents a summary of the 2017/18 ASR Estimate to support the 2017 Work Plan in a categorized breakdown format that was estimated in accordance to principles, methodology, and closure objectives defined within the Mary River Project Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012).

Table 4-1: Mary River Project 'Global' Closure and Reclamation Security Summary[1]

	A	B	C	D	E	F	G
	Authorization	**Liability**	**Global Estimate from 2016/17 ASR ($)**	**2017/18 ASR Marginal Estimate ($)**	**Total 'Global' Estimated Security for 2017/18 ($)**	**Total Posted ($)**	**Adjustment to be Posted ($)**
					C + D		**E - F**
1	Type A 2AM-MRY1325	IOL[2]	45,055,000	1,880,000	46,935,000	48,846,000	(1,911,000)
2		Crown	1,210,000	-	1,210,000	1,210,000	-
3		Water	1,342,000	-	1,342,000	-	-
4		Land	44,923,000	1,880,000	46,803,000	-	-
5	*Subtotal Type A*		*46,265,000*	*1,880,000*	*48,145,000*	*50,056,000*	*(1,911,000)*
6	Type B Construction 2BC-MRY1416	IOL[2]	-	-	-	-	-
7		Crown	-	-	-	147,000	(147,000)
8		Water	-	-	-	-	-
9		Land	-	-	-	-	-
10	*Subtotal Type B Construction*		*-*	*-*	*-*	*-*	*(147,000)*
11	Type B Exploration 2BE-MRY1421 [3]	IOL	165,000	-	165,000	-	165,000
12		Crown	1,082,000	-	1,082,000	1,250,000	(168,000)
13		Water	18,000	-	18,000	-	-
14		Land	1,229,000	-	1,229,000	-	-
15	*Subtotal Type B Exploration*		*1,247,000*	*-*	*1,247,000*	*1,247,000*	*(3,000)*
16	DFO Security Associated with Ore Dock	IOL[2]	-	-	-	-	-
17		Crown	563,000	-	563,000	563,000	-
18		Water	563,000	-	563,000	563,000	-
19		Land	-	-	-	-	-
20	*Subtotal DFO*		*563,000*	*-*	*563,000*	*563,000*	*-*
21	AANDC Land Lease 47H/16-1-2 [4,5]	IOL[2]	-	-	-	-	-
22		Crown	4,975,000	-	4,975,000	4,975,000	-
23		Water	-	-	-	-	-
24		Land	4,975,000	-	4,975,000	4,975,000	-
25	*Subtotal AANDC Land Lease*		*4,975,000*	*-*	*4,975,000*	*4,975,000*	*-*
27	**GRAND TOTAL**		**53,050,000**	**1,880,000**	**54,930,000**	**58,721,000**	**(2,061,000)**

NOTES:

1) Totals rounded to nearest '000 in CAD
2) Security relating to IOL held by Qikiqtani Inuit Association (QIA) under Commercial Lease No. Q13C301
3) As per Mary River Exploration Project Closure and Reclamation Plan (BAF-PH1-830-P16-0038, Rev 1)
4) Posting process for security relating to AANDC Land Lease 47H/16-1-2 phased into a 2-step approach. Phase 1 to be posted November 2016.
5) As per Closure and Reclamation Strategy and Financial Security Estimate for Nunavut Lease #47H/16-1-2 (H349001-2000-07-126-0001, Rev.0)

Table 4-2: 2017 Estimated Closure and Reclamation Security Detailed Summary[1]

Cost	Global Estimate from 2016/17 ASR ($)	2017/18 ASR Marginal Estimate ($)	Total 'Global' Estimated Security for 2017/18 ($)	IOL	Crown Land	Water Liability	Land Liability
Direct Costs				**Direct Costs**			
Project Wide	1,395,000	83,000	1,478,000	1,254,000	224,000	-	1,478,000
Milne Port	5,670,000	591,000	6,261,000	6,261,000	-	227,000	6,034,000
Construction Facilities & Services	2,102,000	45,000	2,147,000	2,147,000	-	-	2,147,000
Mine Site	8,205,000	621,000	8,826,000	8,826,000	-	1,115,000	7,711,000
Tote Road	4,695,000	(166,000)	4,529,000	4,056,000	473,000	-	4,529,000
Mary River Exploration Activities	1,022,000	-	1,022,000	135,000	887,000	15,000	1,007,000
Subtotal	*23,089,000*	*1,174,000*	*24,263,000*	*22,679,000*	*1,584,000*	*1,357,000*	*22,906,000*
Indirect Costs				**Indirect Costs**			
Off-Site Disposal of Waste & Material	1,969,000	-	1,969,000	1,969,000	-	-	1,969,000
Fuel Mobilization and Demobilization	3,152,000	28,000	3,180,000	3,180,000	-	-	3,180,000
Ammonium Nitrate (explosive material)	2,537,000	-	2,537,000	2,537,000	-	-	2,537,000
Contaminated Soil Treatment	239,000	63,000	302,000	302,000	-	-	302,000
Mobilization of Workers Required for Reclamation	988,000	40,000	1,028,000	996,000	32,000	-	1,028,000
Worker Accommodation & Camp Operation	2,560,000	108,000	2,668,000	2,585,000	83,000	-	2,668,000
Mob/Demob of Equipment and Materials by Sealift	2,206,000	117,000	2,323,000	2,253,000	70,000	-	2,323,000
Short Term C&M, Closure Monitoring & Reporting	3,766,000	-	3,766,000	3,647,000	119,000	-	3,766,000
Supervision, PM & Contract Administration	2,256,000	116,000	2,372,000	2,304,000	68,000	-	2,372,000
Engineering Fees	861,000	46,000	907,000	880,000	27,000	-	907,000
Contingency	3,663,000	188,000	3,851,000	3,738,000	113,000	-	3,851,000
Mary River Exploration Activities	225,000	-	225,000	30,000	195,000	3,000	222,000
DFO Financial Security for Ore Dock	563,000	-	563,000	-	563,000	563,000	-
AANDC Land Lease	4,975,000	-	4,975,000	-	4,975,000	-	4,975,000
Subtotal	*29,960,000*	*706,000*	*30,666,000*	*24,421,000*	*6,245,000*	*566,000*	*30,100,000*
TOTAL	**53,049,000**	**1,880,000**	**54,929,000**	**47,100,000**	**7,829,000**	**1,923,000**	**53,006,000**

NOTES:
1) All totals rounded to nearest '000 in CAD

5. Supporting Documents

In addition to information presented within this document, please refer to the following appendices for supporting information:

- Refer to Appendix A for the 2017/18 ASR Estimate Breakdown Structure (EBS).
- Refer to Appendix B for updated 2017 Work Plan Layouts.
- Refer to Appendix C for supporting documentation for estimated quantities including:
  - C.1 Milne Port Ore Stockpile Pad extension sketch
  - C.2 Mine Site Crusher Pad extension sketch

Appendix A:

2017/18 ASR Estimate Breakdown Structure (EBS)

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
1000	Project Wide																																																														
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			CON	Consumables	CON		Consumables		Consumables		550	Bed Space	0.0	700.8	0.0	0.0	700.8	0	385,441	0	0	385,441	0	0	100%	0%	0%	100%	385,441	0	0	385,441	Type A 2AM-MRY1325	Added	2015 R	Direct					100%						0		0	0	385,441	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			CON	Consumables	CON		Consumables		Consumables - addition of 49 person camp		49	Bed Space	0.0	700.8	0.0	0.0	700.8	0	34,339	0	0	34,339	0	0	100%	0%	0%	100%	34,339	0	0	34,339	Type A 2AM-MRY1325	Added	2017	Direct					100%						0		0	0	34,339	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2014		11,768	m2	0.2	2.0	22.2	22.2	44.4	2,878	23,855	260,707	261,420	522,127	0	0	100%	0%	0%	100%	522,127	0	0	522,127	Type A 2AM-MRY1325	Modified	2014	Direct					100%						0		0	0	522,127	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015		378	m2	0.2	2.0	22.2	22.2	44.4	92	766	8,374	8,397	16,771	0	0	100%	0%	0%	100%	16,771	0	0	16,771	Type A 2AM-MRY1325	Modified	2015	Direct					100%						0		0	0	16,771	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015 A		8	m2	0.2	2.0	22.2	22.2	44.4	2	16	178	178	356	0	0	100%	0%	0%	100%	356	0	0	356	Type A 2AM-MRY1325	Modified	2015 A	Direct					100%						0		0	0	356	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015 R		5,038	m2	0.2	2.0	22.2	22.2	44.4	1,232	10,213	111,622	111,927	223,548	0	0	100%	0%	0%	100%	223,548	0	0	223,548	Type A 2AM-MRY1325	Added	2015 R	Direct					100%						0		0	0	223,548	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2016		668	m2	0.2	2.0	22.2	22.2	44.4	163	1,355	14,806	14,847	29,653	0	0	100%	0%	0%	100%	29,653	0	0	29,653	Type A 2AM-MRY1325	Added	2016	Direct					100%						0		0	0	29,653	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2017		1,095	ea	0.2	2.0	22.2	22.2	44.4	268	2,219	24,251	24,318	48,569	0	0	100%	0%	0%	100%	48,569	0	0	48,569	Type A 2AM-MRY1325	Added	2017	Direct					100%						0		0	0	48,569	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - Shiploader		5,049	m2	0.2	2.0	22.2	22.2	44.4	1,235	10,235	111,856	112,162	224,018	0	0	0%	100%	0%	100%	0	224,018	0	224,018	Type A 2AM-MRY1325	Added	2015 R	Direct					100%						0		0	0	224,018	0	0	0	0	0
2000	Milne Port																																																														
2000	Milne Port	2100	General																																																												
2000	Milne Port	2100	General	2110	Communication and IT Infrastructure	2110	Communication and IT Infrastructure	001	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed - Demolish Building ISO Shipping Container	2110-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Milne Laydown Area		37,375	m2	0.0	0.1	1.3	0.4	1.8	474	5,466	47,428	14,821	67,715	0	0	100%	0%	0%	100%	67,715	0	0	67,715	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		22,572	22,572	22,572	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Disturbed Area @ Milne Port (adjacent to Steel Tank Farm)		45,000	m2	0.0	0.1	1.3	0.4	1.8	571	6,581	57,104	17,845	81,530	0	0	100%	0%	0%	100%	81,530	0	0	81,530	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		27,177	27,177	27,177	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2134				A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Camp Pad @ Milne Port		66,536	m2	0.0	0.1	1.3	0.4	1.8	844	9,731	84,433	26,385	120,549	0	0	100%	0%	0%	100%	120,549	0	0	120,549	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		40,183	40,183	40,183	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2136	Milne Port			A3	Grade & Re-Contour	A9	Site Works	Grade and Re-Contour Building Footprints		Grade and Re-Contour Building Footprints		14,306	m2	0.0	0.1	1.3	0.4	1.8	182	2,092	18,154	5,673	25,919	0	0	100%	0%	0%	100%	25,919	0	0	25,919	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		8,640	8,640	8,640	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Site Roads		12,149	m2	0.0	0.1	1.3	0.4	1.8	154	1,777	15,416	4,817	22,010	0	0	100%	0%	0%	100%	22,010	0	0	22,010	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		7,337	7,337	7,337	0	0	0	0	0
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT031	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		JOHN DEREE LIGHT TOWER	ALT032	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 AMBULANCE 2014	EMG008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FOUNTAIN TIRE ATLAS COPCO COMPRESSOR	FCM001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT CATERPILLAR PD7000	FKT002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT CATERPILLAR 2ET4000	FKT003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT MITSUBISHI FB20PNT	FKT004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT CATERPILLAR DP40K-D	FKT007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT VALLEE	FKT009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLAMELESS SPARKLESS HEATER	FSH001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLAMELESS SPARKLESS HEATER	FSH002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR SNOW PLOW	HTP017	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		GMC C8500 FOUNTAIN TIRE	HTP020	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		KENWORTH SERVICE TRUCK TOROMONT ML	HTP021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FREIGHTLINER VAC TRUCK	HTP026	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		HOTSY MOUNTED ON TRAILER	HTY001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLOAT TRAILER 20 FT - PINTLE HOOK	LBT004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		950H SNOW REMOVAL LOADER	LDR016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		950H SNOW REMOVAL LOADER	LDR017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP022	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP023	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2008	LTP032	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2013	LTP035	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2013	LTP036	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2008	LTP037	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP039	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP041	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP042	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP048	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP049	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP050	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP051	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP052	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP053	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP054	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP055	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 CREW CAB 4X4 - 2011	LTP061	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 CREW CAB 4X4	LTP062	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 CREW CAB 4X4 2012	LTP064	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 CREW CAB 4X4 2012	LTP065	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 CREW CAB 4X4 2008	LTP066	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 CREW CAB 4X4 2013 DECK TRUCK	MTP003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013	MTP006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SERVICE TRUCK FOUNTAIN TIRE 2015	MTP017	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP	PWP005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP	PWP006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 289C ALL TERRAIN	SKD006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 246 ALL TERRAIN	SKD007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		CAT SKID STEER 2622C2	SKD011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 01	SKJ001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 02	SKJ002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 04	SKJ004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 05	SKJ005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 06	SKJ006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKYJACK/MANLIFT	SKJ007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKYJACK/SCISSOR LIFT	SKJ008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKYJACK/MANLIFT	SKJ009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		MANLIFT - CROWN WAVE	SKJ011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TUNDRA SKI-DOO 2007	SNM001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TUNDRA SKI-DOO 2008	SNM002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE KUBOTA RTV900	SXS002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER TANDEM UTILITY FLAT DECK	TRL003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER TANDEM UTILITY FLAT DECK	TRL004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER TANDEM UTILITY FLAT DECK	TRL005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER TANDEM UTILITY FLAT DECK	TRL006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER MILLER AIR PAK	WLD009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		48 PASSENGER BUS	BUS006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		24 PASSENGER BUS	BUS007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		INTERNATIONAL 4400 FUEL TRUCK	FLT012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT WATER TRUCK ML 2013	HTP001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WATER TRUCK	HTP002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		KENWORTH WATER/METHANOL TRUCK	HTP003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		KENWORTH T800 W/ KNUCKLE BOOM 2004	HTP008	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT 367 2014	HTP012	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT 379 2014	HTP023	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT ROLL OFF TRUCK	HTP027	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR PLOW TRUCK	HTP028	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR TRACTOR	HTP031	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT	JLG001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT Z45/25	JLG003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT Z60/34	JLG006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT 450 AJ SERIES	JLG009	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ROLLER CP563E	RLR001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TL1255	TLH001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER GEHL	TLH006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		CAT TELEHANDLER TL1055C	TLH007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		KALMAR CONTAINER HANDLER	CNH002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		GROVE RT890E CRANE	CRN001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		MINI-CRAWLER CRANE URW-295 (diesel)	CRN005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MASABA PORTABLE CONVEYOR	CRURC2	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		OSHKOSH FIRE TRUCK 1998 -T13000 MILNE	EMG001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		345DL EXCAVATOR CATERPILLAR	EXC004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		320BL EXCAVATOR CATERPILLAR	EXC007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2008 GEHL LIFT TRUCK	FKT008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SNOW BLOWER VOHL DV4000	SBL001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Ford F350 Pickup		6	Ea	6.7	25.0	666.1	250.0	941.1	40	150	3,997	1,500	5,647	4	24	100%	0%	0%	100%	5,647	0	0	5,647	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		1,882	0	1,882	0	0	0	0	1,882
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Freightliner School Bus		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Kenworth Fuel Lube Truck		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Grove 60 Ton Crane		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	CAT 988 Loader		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	CAT 992 Loader		4	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	52	480	5,195	4,800	10,475	96	384	100%	0%	0%	100%	10,475	0	0	10,475	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		3,492	0	3,492	0	0	0	0	3,492
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	CAT 930 Loader		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	CAT 345 Excavator		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	John Deere 850 Excavator		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Ford F550 Mechanics Truck		2	Ea	6.7	25.0	666.1	250.0	941.1	13	50	1,332	500	1,882	4	8	100%	0%	0%	100%	1,882	0	0	1,882	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		627	0	627	0	0	0	0	627
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Generator 3412-725 KW (Seacan)		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Lunch Rooms		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Man Lift		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Zoom Boom		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Skid-steer		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Stockpile Mobile Feeder		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Stockpile Mobile Stacker		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Reclaim Mobile Feeder		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Jump Conveyor		2	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	26	240	2,598	2,400	5,238	96	192	100%	0%	0%	100%	5,238	0	0	5,238	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		1,746	0	1,746	0	0	0	0	1,746
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Mobile Light Plant, Large		5	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	65	600	6,494	6,000	13,094	96	480	100%	0%	0%	100%	13,094	0	0	13,094	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		4,365	0	4,365	0	0	0	0	4,365
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Pick-Up Truck		7	Ea	6.7	25.0	666.1	250.0	941.1	47	175	4,663	1,750	6,588	4	28	100%	0%	0%	100%	6,588	0	0	6,588	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		2,196	0	2,196	0	0	0	0	2,196
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	Pick-Up Truck		6	Ea	6.7	25.0	666.1	250.0	941.1	40	150	3,997	1,500	5,647	4	24	100%	0%	0%	100%	5,647	0	0	5,647	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,882	0	1,882	0	0	0	0	1,882
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Flat Deck Truck		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Mini-Crane		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Boom Truck		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Container Handler		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Gantry Crane		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Passenger Bus		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Marine Patrol Boat		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Stockpile Reclaim Loader, 988		2	Ea	10.0	45.0	999.1	450.0	1,494.1	20	90	1,998	900	2,988	24	48	100%	0%	0%	100%	2,988	0	0	2,988	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		996	0	996	0	0	0	0	996
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Integrated Tool Carrier, 938		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	WRECKER TRUCK		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	MECHANICS TRUCK,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	SKELETON TRAILER,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	SKELETON TRAILER,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	FREIGHT HAUL TRACTOR ,		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	FIRE TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	MAINTENANCE FUEL/LUBE TRUCK ,		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		4400 GAL STAINLESS STEEL WATER TANK		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FORD F-350 SILVER PICK-UP , VIN # 1FTWW3BROAEB22478		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		HYDRAULIC PRESS		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FORD F-550 WHITE SERVICE TRUCK XLT FEC061335A		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FORD F-550 WHITE SERVICE TRUCK XLT FEC061336A		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TRACTOR FRTL CABOVER UNIT 512202		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TRACTOR FRTL CABOVER UNIT 512402		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRI-DRIVE V.I.N. # 5KJRASD18CPBF7663		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK VIN # 5KJRAS013BPAZ8119		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK VIN # 5KJRASD1XBPAZ8117		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK NO: OHT033		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK NO: OHT028		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK OTH027		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK VIN # 5KJRASD14BPAZ8114		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		40' FLATRACK TOLU 897574-0, STC JET FUEL A1 FS II DRUMS 205 L		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK VIN# 5KJRASD16BPA28115		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		M320F WHEELED EXCAVATOR		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		CATERPILLAR 2620 SKID STEER LOADER C/W BUCKET (BOBCAT) S/N 6555GP113734, VIN # CAT0262DVLST00504		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2008 KENWORTH MECHANICAL TRUCK VIN# 2NKMHN7XX8M212914		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 FREIGHTLINER SERVICE TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		SEWAGE TANK SERAIL # ST111-0716		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		WATER TANK SERIAL # WT110-0070		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		MOBILE OFFICE ON WHEELS SERIAL # 240073498		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2004 PETERBILT TANKER TRUCK VIN# 2NPNHD8X24M822016		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK, DOUBLE WALLED 2494 LITER		1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,231	0	1,231	0	0	0	0	1,231
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GENSET RADIATOR		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GENSET RADIATOR		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SW-95 IRONWORKER		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SW-95 IRONWORKER		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		KNEE MILL		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		KNEE MILL		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		BANDSAW		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		BANDSAW		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		LATHE		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINING TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINING TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINING TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		60/30 CENTER CAR BODY W BELLY PLATE		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G BODY		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD18GPHD7176		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD18GPHD7175		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLATBED 3 AXLES 533C001		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLATBED 3 AXLES 133W003		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLATBED 3 AXLES UNIT 833X004		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		STEP DECK 3 AXLES UNIT 5334652		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2200	Marine																																																												
2000	Milne Port	2300	Material Handling																																																														
2000	Milne Port	2300	Material Handling	2340	Stockpile	2341	Ore Stacking System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Ore Stockpile Laydown		230,546	m2	0.0	0.1	1.3	0.4	1.8	2,926	33,717	292,560	91,422	417,699	0	0	100%	0%	0%	100%	417,699	0	0	417,699	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		139,233	139,233	139,233	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2341	Ore Stacking System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Ore Stockpile Pad Expansion		82,000	m2	0.0	0.1	1.3	0.4	1.8	1,041	11,993	104,057	32,517	148,566	0	0	100%	0%	0%	100%	148,566	0	0	148,566	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%	33%	33%						0		49,522	49,522	49,522	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2341	Ore Stacking System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Ore Stockpile Footprints		128,866	m2	0.0	0.1	1.3	0.4	1.8	1,635	18,847	163,529	51,101	233,477	0	0	100%	0%	0%	100%	233,477	0	0	233,477	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		77,826	77,826	77,826	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	129	CV-	CV	Reclaim Conveyor	CV	Mechanical Equipment	Reclaim Conveyor		CONVEYING - RECLAIM CONVEYOR - FAM L: 850000, W: 1524, H: 47000 VERTICAL LIFT SEE REMARKS kg	2342-CV-001	1	Ea	5,018	75,276	501,405	752,760	1,329,441	5,018	75,276	501,405	752,760	1,329,441	1,020	1,020	100%	0%	0%	100%	1,329,441	0	0	1,329,441	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		443,147	443,147	443,147	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	129	CV-	CV	Reclaim Conveyor	CV	Mechanical Equipment	Reclaim Conveyor		'Cross' Conveyor at Ore Stockpile Pad (assume 1/6 length of exsisting shiploader converyor)		0.17	Ea	5,018	75,276	501,405	752,760	1,329,441	836	12,546	83,568	125,460	221,574	1,020	170	100%	0%	0%	100%	221,574	0	0	221,574	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		73,858	73,858	73,858	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	141	SA-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment		Feeder (Small)		3	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	58	639	5,755	6,390	12,784	1	3	100%	0%	0%	100%	12,784	0	0	12,784	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		4,261	0	4,261	0	0	0	0	4,261
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	141	SA-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment		Jump Conveyor		12	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	230	2,556	23,020	25,560	51,136	1	12	100%	0%	0%	100%	51,136	0	0	51,136	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		17,045	0	17,045	0	0	0	0	17,045
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	141	SA-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment		Screener		1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	141	SA-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment		Cone Crusher		1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Reclaim Feeding, Line 2	Reclaim Feeding, Line 2	ML-PRO-SHL-010-RFL01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	0	0	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - % (C&M)	Year 0+1 - % (C&M)	Year 1 - % (Closure)	Year 2 - % (Closure)	Year 3 - % (Closure)	Year 4 - % (Post Closure)	Year 5 - % (Post Closure)	Year 6 - % (Post Closure)	Year 7 - % (Post Closure)	Year 8 - % (Post Closure)	Year 0 - Cost ($) (C&M)	Year 0+1 - Cost ($) (C&M)	Year 1 - Cost ($) (Closure)	Year 2 - Cost ($) (Closure)	Year 3 - Cost ($) (Closure)	Year 4 - Cost ($) (Post Closure)	Year 5 - Cost ($) (Post Closure)	Year 6 - Cost ($) (Post Closure)	Year 7 - Cost ($) (Post Closure)	Year 8 - Cost ($) (Post Closure)
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Reclaim Feeding, Line 2	Reclaim Feeding, Line 3	ML-PRO-SHL-010-RFL03	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	0	0	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Reclaim Feeding, Line 2	Reclaim Feeding, Line 4	ML-PRO-SHL-010-RFL04	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	0	0	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
2000	Milne Port	2300	Material Handling	2340	Stockpile	2345	Stockpile Settling Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Ore Stockpile Settling Ponds		11,424	m2	0.0	0.2	4.4	0.7	5.3	508	2,034	50,824	8,163	61,021	0	0	100%	0%	0%	100%	61,021	0	0	61,021	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		20,340	20,340	20,340	0	0	0	0	0
2000	Milne Port	2400	Aerodrome																																																												
2000	Milne Port	2500	Non Process Facilities																																																													
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2511	Service Core	227	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Service Core - Demolish and Decontaminate Building - Special Modular / Prefabricated	2511-BLD-001	1,388	m2	0.2	3.4	22.4	33.6	59.4	311	4,669	31,098	46,688	82,454	1	1,388	100%	0%	0%	100%	82,454	0	0	82,454	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		27,485	27,485	27,485	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2511	Service Core	230	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Office - Demolish and Decontaminate Building - Special Modular / Prefabricated	2511-BLD-002	335	m2	0.2	3.4	22.4	33.6	59.4	75	1,125	7,494	11,250	19,869	1	335	100%	0%	0%	100%	19,869	0	0	19,869	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		6,623	6,623	6,623	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2511	Service Core	233	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Laundry - Demolish and Decontaminate Building - Special Modular / Prefabricated	2511-BLD-003	424	m2	0.2	3.4	22.4	33.6	59.4	95	1,425	9,492	14,250	25,167	1	424	100%	0%	0%	100%	25,167	0	0	25,167	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		8,389	8,389	8,389	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2512	Accommodation Wings	237	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing BA - Demolish and Decontaminate Building - Special Modular / Prefabricated	2512-BLD-001	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2512	Accommodation Wings	240	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing BB - Demolish and Decontaminate Building - Special Modular / Prefabricated	2512-BLD-002	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2512	Accommodation Wings	243	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing BC - Demolish and Decontaminate Building - Special Modular / Prefabricated	2512-BLD-003	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2512	Accommodation Wings	246	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing BD - Demolish and Decontaminate Building - Special Modular / Prefabricated	2512-BLD-004	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	250	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Emergency Response Office - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	2513-BLD-001	89	m2	0.2	3.4	22.4	33.6	59.4	20	300	1,998	3,000	5,298	1	89	100%	0%	0%	100%	5,298	0	0	5,298	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,766	1,766	1,766	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	251	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Response Office - Demolish and foundations - Timber Cribbing to Elevate Building	2513-BLD-001	89	m2	0.1	1.2	7.8	11.8	20.8	11	105	699	1,050	1,854	0	27	100%	0%	0%	100%	1,854	0	0	1,854	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		618	618	618	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	253	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Emergency Response Garage - Demolish and Decontaminate Building - Fold-away Building (Steel)	2513-BLD-002	279	m2	0.2	2.4	15.7	23.5	41.6	44	656	4,371	6,563	11,590	1	279	100%	0%	0%	100%	11,590	0	0	11,590	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,863	3,863	3,863	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	254	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Emergency Response Garage - Demolish and foundations - Precast Footing (Perimeter Beam)	2513-BLD-002	279	m2	0.1	2.2	14.5	21.8	38.5	40	607	4,045	6,073	10,725	1	209	100%	0%	0%	100%	10,725	0	0	10,725	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,575	3,575	3,575	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	255	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Emergency Response Garage - Demolish floor finish - Slab on grade C/W Drainage	2513-BLD-002	279	m2	0.1	1.9	12.5	18.8	33.1	35	523	3,482	5,228	9,233	0	0	100%	0%	0%	100%	9,233	0	0	9,233	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,078	3,078	3,078	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	265	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - EMERGENCY RESPONSE OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791, W: 1829, H: 610	2513-TK-003	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	266	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - EMERGENCY RESPONSE OFFICE RAW WATER TANK - NORWESCO L: 1613, W: 737, H: 1676	2513-TK-004	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	267	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE EMERGENCY RESPONSE GARAGE DIESEL FUEL TANK - DTE ULC601-07	2513-TK-023	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	270	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Maintenance Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2521-BLD-001	892	m2	0.6	2.4	56.0	84.1	142.4	500	2,100	49,957	75,000	127,057	1	892	100%	0%	0%	100%	127,057	0	0	127,057	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		42,352	42,352	42,352	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	271	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Maintenance Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2521-BLD-001	892	m2	0.1	2.2	14.5	21.8	38.5	130	1,943	12,944	19,433	34,320	1	669	100%	0%	0%	100%	34,320	0	0	34,320	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		11,440	11,440	11,440	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	272	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Maintenance Building - Demolish floor finish - Slab on grade C/W Drainage	2521-BLD-001	892	m2	0.1	1.9	12.5	18.8	33.1	112	1,673	11,143	16,729	29,544	0	0	100%	0%	0%	100%	29,544	0	0	29,544	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		9,848	9,848	9,848	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	273	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Welding Shop Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2521-BLD-002	149	m2	0.6	2.4	56.0	84.1	142.4	83	350	8,326	12,500	21,176	1	149	100%	0%	0%	100%	21,176	0	0	21,176	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		7,059	7,059	7,059	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	274	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Welding Shop Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2521-BLD-002	149	m2	0.1	2.2	14.5	21.8	38.5	22	324	2,157	3,239	5,720	1	112	100%	0%	0%	100%	5,720	0	0	5,720	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,907	1,907	1,907	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	275	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Welding Shop Building - Demolish floor finish - Slab on grade	2521-BLD-002	149	m2	0.1	1.9	12.5	18.8	33.1	19	279	1,857	2,788	4,924	0	0	100%	0%	0%	100%	4,924	0	0	4,924	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,641	1,641	1,641	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	276	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Workshop Office Building - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	2521-BLD-003	268	m2	0.6	3.4	56.0	84.1	143.4	150	900	14,987	22,500	38,387	1	268	100%	0%	0%	100%	38,387	0	0	38,387	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,796	12,796	12,796	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	277	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Workshop Office Building - Demolish and foundations - Timber Cribbing to Elevate Building	2521-BLD-003	268	m2	0.1	1.2	7.8	11.8	20.8	33	315	2,098	3,150	5,563	0	80	100%	0%	0%	100%	5,563	0	0	5,563	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,854	1,854	1,854	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	279	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Workshop Office Washcar - Demolish and Decontaminate Building - Trailer - Single	2521-BLD-004	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	280	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Workshop Office Washcar - Demolish and foundations - Timber Cribbing to Elevate Building	2521-BLD-004	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	292	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE WELDING SHOP DIESEL FUEL TANK - DTE ULC601-07	2521-TK-005	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	293	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MAINTENANCE BUILDING DIESEL FUEL TANK - DTE ULC601-07	2521-TK-013	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	294	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - WORKSHOP OFFICE WASHCAR RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803, W: 1245, H: 1346	2521-TK-050	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	295	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - WORKSHOP OFFICE WASHCAR SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791, W: 1829, H: 610	2521-TK-053	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	296	In Meters	piping	Piping	Piping	Bulks	Piping		Maintenance Building Utility Piping - Piping Installation - Water, air and lube piping inside building	2521.5-P	255	m	0.3	3.8	25.0	37.5	66.2	64	956	6,369	9,563	16,888	0	3	100%	0%	100%	0%	16,888	0	16,888	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,629	5,629	5,629	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Anmar Workshop		1,670	m2	0.0	0.2	4.4	0.7	5.3	74	297	7,430	1,193	8,865	0	0	100%	0%	0%	100%	8,865	0	0	8,865	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%	33%	33%						0		2,955	2,955	2,955	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2522	Services Equipment	317	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment		Light Plant		10	Ea	8.1	106.5	809.3	1,065.0	1,980.8	81	1,065	8,093	10,650	19,808	1	5	100%	0%	0%	100%	19,808	0	0	19,808	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		6,603	0	6,603	0	0	0	0	6,603
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2522	Services Equipment	317	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment		Frost Fighter Heater		10	Ea	8.1	106.5	809.3	1,065.0	1,980.8	81	1,065	8,093	10,650	19,808	1	5	100%	0%	0%	100%	19,808	0	0	19,808	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		6,603	0	6,603	0	0	0	0	6,603
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2522	Services Equipment		FRF	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Heater	Frost Fighter Heater	ML-FAC-POH-010	38	Ea	8.1	106.5	809.3	1,065.0	1,980.8	308	4,047	30,753	40,470	75,270	1	19	100%	0%	0%	100%	75,270	0	0	75,270	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		25,090	0	25,090	0	0	0	0	25,090
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	327	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-001	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	330	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-002	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	333	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #3 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-003	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	336	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #4 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-004	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	339	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #5 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-005	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	342	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #6 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-006	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	345	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #7 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-007	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	348	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #8 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-008	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	351	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-009	75	m2	0.6	3.4	56.0	84.1	143.4	42	253	4,215	6,328	10,796	1	75	100%	0%	0%	100%	10,796	0	0	10,796	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,599	3,599	3,599	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	354	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-010	75	m2	0.6	3.4	56.0	84.1	143.4	42	253	4,215	6,328	10,796	1	75	100%	0%	0%	100%	10,796	0	0	10,796	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,599	3,599	3,599	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	357	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Power Generation Stores - Demolish and Decontaminate Building - ISO Shipping Container	2530-BLD-011	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,422	1,422	1,422	0	0	0	0	0

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Electrical office - Demolish and Decontaminate Building - Fold-away Building (Steel)	2530-BLD-BIM-001	20	m2	0.2	3.4	22.4	33.6	59.4	4	67	448	673	1,188	1	20	100%	0%	0%	100%	1,188	0	0	1,188	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		396	396	396	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation		BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Electrical Shop - Demolish and Decontaminate Building - Fold-away Building (Steel)	2530-BLD-BIM-002	56	m2	0.2	2.4	15.7	23.5	41.6	9	132	878	1,318	2,328	1	56	100%	0%	0%	100%	2,328	0	0	2,328	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		776	776	776	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation		BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Electrical Shop - Demolish and foundations - Precast Footing (Perimeter Beam)	2530-BLD-BIM-002	56	m2	0.1	2.2	14.5	21.8	38.5	8	122	812	1,220	2,154	1	42	100%	0%	0%	100%	2,154	0	0	2,154	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		718	718	718	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and incinerator)	2540	Waste Management (building and incinerator)	361	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Waste Management Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2540-BLD-001	446	m2	0.6	2.4	56.0	84.1	142.4	250	1,050	24,978	37,500	63,528	1	446	100%	0%	0%	100%	63,528	0	0	63,528	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		21,176	21,176	21,176	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and incinerator)	2540	Waste Management (building and incinerator)	362	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Waste Management Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2540-BLD-001	446	m2	0.1	2.2	14.5	21.8	38.5	65	972	6,472	9,716	17,160	1	335	100%	0%	0%	100%	17,160	0	0	17,160	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,720	5,720	5,720	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and incinerator)	2540	Waste Management (building and incinerator)	363	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Waste Management Building - Demolish floor finish - Slab on grade C/W Drainage	2540-BLD-001	446	m2	0.1	1.9	12.5	18.8	33.1	56	836	5,571	8,364	14,772	0	0	100%	0%	0%	100%	14,772	0	0	14,772	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		4,924	4,924	4,924	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and incinerator)	2540	Waste Management (building and incinerator)	364	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Waste Incinerators - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	2540-VP-001	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,914	4,375	7,464	1	52	100%	0%	0%	100%	7,464	0	0	7,464	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,488	2,488	2,488	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and incinerator)	2540	Waste Management (building and incinerator)	374	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE WASTE MANAGEMENT BUILDING DIESEL FUEL TANK - DTE ULC601-07	2540-TK-003	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and incinerator)	2540	Waste Management (building and incinerator)	375	VP-	VP1	VENDOR PKG - Incenerator	VP1	Packaged Facilities	Incinerator		WASTE INCINERATOR VENDOR PACKAGE	2540-VP-001	1	Ea	47.0	480.0	4,695.9	4,800.0	9,975.9	47	480	4,696	4,800	9,976	329	329	100%	0%	0%	100%	9,976	0	0	9,976	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,325	3,325	3,325	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Landfarm		12,933	m2	**0.0**	**0.2**	**4.4**	**0.7**	**5.3**	**575**	**2,303**	**57,539**	**9,241**	69,083	0	0	100%	0%	0%	100%	69,083	0	0	69,083	Type B Construction 2BC-MRY1416	Modified	2014	Direct			33%	33%	33%						0		23,028	23,028	23,028	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-1	2,000	m2	0.04	0.18	4.4	0.71	5.3	89	356	8,898	1,429	10,617	0	0	100%	0%	0%	100%	10,617	0	0	10,617	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		3,539	3,539	3,539	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-2	272	m2	0.04	0.18	4.4	0.71	5.3	12	48	1,210	194	1,444	0	0	100%	0%	0%	100%	1,444	0	0	1,444	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		481	481	481	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-3	678	m2	0.04	0.18	4.4	0.71	5.3	30	121	3,016	484	3,599	0	0	100%	0%	0%	100%	3,599	0	0	3,599	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,200	1,200	1,200	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-4	597	m2	0.04	0.18	4.4	0.71	5.3	27	106	2,656	427	3,169	0	0	100%	0%	0%	100%	3,169	0	0	3,169	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,056	1,056	1,056	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-5	652	m2	0.04	0.18	4.4	0.71	5.3	29	116	2,901	466	3,461	0	0	100%	0%	0%	100%	3,461	0	0	3,461	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,154	1,154	1,154	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-6	34	m2	0.04	0.18	4.4	0.71	5.3	2	6	151	24	180	0	0	100%	0%	0%	100%	180	0	0	180	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		60	60	60	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Snow Dump		3,189	m2	0.04	0.18	4.4	0.71	5.3	142	568	14,188	2,279	16,928	0	0	100%	0%	0%	100%	16,928	0	0	16,928	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		5,643	5,643	5,643	0	0	0	0	0
2000	Milne Port	2600	Fuel System																																																												
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2611	Containment Dyke			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Fuel Tank Farm Berm		25,393	m2	0.0	0.2	4.4	0.7	5.3	1,130	4,521	112,973	18,144	135,639	0	0	100%	0%	0%	100%	135,639	0	0	135,639	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		67,819	67,819	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	384	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Diesel Fuel Dispensing Module - Demolish and Decontaminate Building - ISO Shipping Container	2613-FD-013	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,066	1,066	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	387	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Diesel Fuel Dispensing Module - Demolish and Decontaminate Building - ISO Shipping Container	2613-FD-014	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		2,133	2,133	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	398	TK-	MT4-d	Largest Diesel Tanks (10M L to 12M L)	MT4-d	Mechanical Equipment	Largest Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 27800 DI H: 15250	2613-TK-001	1	Ea	679.4	9,417.0	67,881.2	94,170.0	171,468.2	679	9,417	67,881	94,170	171,468	160	160	100%	0%	0%	100%	171,468	0	0	171,468	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		85,734	85,734	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	399	TK-	MT4-d	Largest Diesel Tanks (10M L to 12M L)	MT4-d	Mechanical Equipment	Largest Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 27800 DI H: 15250	2613-TK-002	1	Ea	679.4	9,417.0	67,881.2	94,170.0	171,468.2	679	9,417	67,881	94,170	171,468	160	160	100%	0%	0%	100%	171,468	0	0	171,468	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		85,734	85,734	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	400	TK-	MT4-d	Largest Diesel Tanks (10M L to 12M L)	MT4-d	Mechanical Equipment	Largest Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 27800 DI H: 15250	2613-TK-003	1	Ea	679.4	9,417.0	67,881.2	94,170.0	171,468.2	679	9,417	67,881	94,170	171,468	160	160	100%	0%	0%	100%	171,468	0	0	171,468	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		85,734	85,734	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	401	TK-	MT4-d	Largest Diesel Tanks (10M L to 12M L)	MT4-d	Mechanical Equipment	Largest Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 27800 DI H: 15250	2613-TK-004	1	Ea	679.4	9,417.0	67,881.2	94,170.0	171,468.2	679	9,417	67,881	94,170	171,468	160	160	100%	0%	0%	100%	171,468	0	0	171,468	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		85,734	85,734	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	402	TK-	MT3-d	Large Diesel Tanks Load and Transport (5M L)	MT3-d	Mechanical Equipment	Large Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 25600 DI H: 9760	2613-TK-005	1	Ea	418.6	5,865.0	41,823.7	58,650.0	106,338.7	419	5,865	41,824	58,650	106,339	80	80	100%	0%	0%	100%	106,339	0	0	106,339	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		53,169	53,169	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	403	TK-	MT3-d	Large Diesel Tanks Load and Transport (5M L)	MT3-d	Mechanical Equipment	Large Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 25600 DI H: 9760	2613-TK-006	1	Ea	418.6	5,865.0	41,823.7	58,650.0	106,338.7	419	5,865	41,824	58,650	106,339	80	80	100%	0%	0%	100%	106,339	0	0	106,339	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		53,169	53,169	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System		ENE	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Diesel Module	Diesel Module	ML-FUM-FDI-010	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System		TK-	MT5-d	Medium Mobile Diesel Tanks (3000 L to 500k L)	MT5-d	Mechanical Equipment	Medium Mobile Diesel Tanks		50,000 L Portable Fuel Dispensing Unit		2	Ea	42.7	564.8	4,268.8	5,647.5	10,481.0	85	1,130	8,538	11,295	20,962	30	60	100%	0%	0%	100%	20,962	0	0	20,962	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		6,987	0	6,987	0	0	0	0	6,987
2000	Milne Port	2700	Site Utilities	2610	Milne Tank Farm	2613	Arctic Diesel System			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		50,000 L Portable Fuel Dispensing Unit		1,364	m2	0.0	0.2	4.4	0.7	5.3	61	243	6,068	975	7,286	0	0	100%	0%	0%	100%	7,286	0	0	7,286	Type B Construction 2BC-MRY1416	Added	2016	Direct			33%	33%	33%						0		2,429	2,429	2,429	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	405	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Jet-A1 Fuel Dispensing Module - Demolish and Decontaminate Building - ISO Shipping Container	2614-FD-011	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,066	1,066	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	413	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - JET-A1 TANK W: 10250 DI H: 9140	2614-TK-007	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	414	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - JET-A1 TANK W: 10250 DI H: 9140	2614-TK-008	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	415	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - JET-A1 TANK W: 10250 DI H: 9140	2614-TK-009	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	416	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - JET-A1 TANK W: 10250 DI H: 9140	2614-TK-010	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System		ENE	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Jet A1 Module	Jet A1 Module	ML-FUM-FDI-020	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2615	Marine Pipeline	418	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Marine Manifold Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2615-BLD-001	32	m2	0.6	2.4	56.0	84.1	142.4	18	74	1,769	2,656	4,500	1	32	100%	0%	0%	100%	4,500	0	0	4,500	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,500	1,500	1,500	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2615	Marine Pipeline	419	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Marine Manifold Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2615-BLD-001	32	m2	0.6	2.4	56.0	84.1	142.4	18	74	1,769	2,656	4,500	1	32	100%	0%	0%	100%	4,500	0	0	4,500	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,500	1,500	1,500	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2616	Weatherhaven camp			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Weatherhaven genset fuel bladder berm		500	m2	0.0	0.2	4.4	0.7	5.3	22	89	2,224	357	2,654	0	0	100%	0%	0%	100%	2,654	0	0	2,654	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		885	885	885	0	0	0	0	0
2000	Milne Port	2700	Site Utilities																																																												
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	431	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Water Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2720-BLD-001	390	m2	0.2	2.4	15.7	23.5	41.6	61	919	6,120	9,188	16,226	1	390	100%	0%	0%	100%	16,226	0	0	16,226	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,409	5,409	5,409	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	432	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Water Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2720-BLD-001	390	m2	0.1	2.2	14.5	21.8	38.5	57	850	5,663	8,502	15,015	1	293	100%	0%	0%	100%	15,015	0	0	15,015	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,005	5,005	5,005	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	448	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - RAW WATER TANK	2720-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	449	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - FIRE WATER TANK	2720-TK-007	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	450	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - POTABLE WATER STORAGE TANK	2720-TK-008	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	451	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - BACKWASH SETTLING TANK	2720-TK-011	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	452	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE WATER BUILDING DIESEL FUEL TANK - DTE ULC601-07	2720-TK-033	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	453	VP-	VP2	VENDOR PKG - Potable Water	VP2	Packaged Facilities	Potable Water		POTABLE WATER TREATMENT PLANT VENDOR PACKAGE VENDOR PACKAGE	2720-VP-020	1	Ea	47.0	480.0	4,695.9	4,800.0	9,975.9	47	480	4,696	4,800	9,976	329	329	100%	0%	100%	0%	9,976	0	9,976	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,325	3,325	3,325	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - POTABLE WATER STORAGE TANK (20 m3)		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Confirmed	2015 A	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	456	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Sewage Chemical Storage Container - Demolish and Decontaminate Building - ISO Shipping Container	2731-BLD-001	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		2,133	2,133	0	0	0	0	0	0

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Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	459	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Sewage Treatment Plant - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	2731-VP-005	178	m2	0.6	3.4	56.0	84.1	143.4	100	600	9,991	15,000	25,591	1	178	100%	0%	0%	100%	25,591	0	0	25,591	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		12,796	12,796	0	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	468	In Meters	piping	Piping	Piping	Bulks	Piping		Sewage Treatment Piping - Piping Installation - Sewage truck bldg to STP	2731.2-P	258	m	0.3	3.8	25.0	37.5	66.2	65	968	6,444	9,675	17,087	0	3	100%	0%	100%	0%	17,087	0	17,087	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,543	8,543	0	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	465	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - TREATED EFFLUENT TANK	2731-TK-002	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type B Construction 2BC-MRY1416		2014	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	466	VP-	VP3	VENDOR PKG - Sewage Treatment Plant	VP3	Packaged Facilities	Sewage Treatment Plant		SEWAGE TREATMENT PLANT VENDOR PACKAGE	2731-VP-005	1	Ea	51.0	540.0	5,095.6	5,400.0	11,035.6	51	540	5,096	5,400	11,036	329	329	100%	0%	100%	0%	11,036	0	11,036	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		5,518	5,518	0	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	470	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Sewage Truck Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2732-BLD-001	56	m2	0.6	2.4	56.0	84.1	142.4	31	131	3,122	4,688	7,941	1	56	100%	0%	0%	100%	7,941	0	0	7,941	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,971	3,971	0	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	471	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Sewage Truck Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2732-BLD-001	56	m2	0.1	2.2	14.5	21.8	38.5	8	121	809	1,215	2,145	1	42	100%	0%	0%	100%	2,145	0	0	2,145	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,073	1,073	0	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	477	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE SEWAGE TRUCK BUILDING DIESEL FUEL TANK - DTE ULC601-07	2732-TK-003	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2734	Treated Effluent Discharge	480	In Meters	piping	Piping	Piping	Bulks	Piping		Treated Effluent Piping - Piping Installation - STP to effluent pond and ocean discharge	2734.1-P	2,595	m	0.3	3.8	25.0	37.5	66.2	649	9,731	64,819	97,313	171,863	0	26	100%	0%	100%	0%	171,863	0	171,863	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		57,288	57,288	57,288	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2735	Off Spec Effluent Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		PWSP	PWSP-1	4,180	m2	0.0	0.2	4.4	0.7	5.3	186	744	18,597	2,987	22,189	0	0	100%	0%	0%	100%	22,189	0	0	22,189	Type B Construction 2BC-MRY1416	Modified	2014	Direct			33%	33%	33%						0		7,396	7,396	7,396	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2735	Off Spec Effluent Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		PWSP	PWSP-2	4,260	m2	0.0	0.2	4.4	0.7	5.3	190	758	18,953	3,044	22,613	0	0	100%	0%	0%	100%	22,613	0	0	22,613	Type B Construction 2BC-MRY1416	Added	2016	Direct			33%	33%	33%						0		7,538	7,538	7,538	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	483	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accomodation Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-001	59	m2	0.2	3.4	22.4	33.6	59.4	13	200	1,332	2,000	3,532	1	59	100%	0%	0%	100%	3,532	0	0	3,532	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,177	1,177	1,177	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	486	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accomodation Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-002	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	489	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-003	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	492	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-004	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	495	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Fuel Tank Farm E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-005	2	m2	0.2	3.4	22.4	33.6	59.4	1	8	52	78	138	1	2	100%	0%	0%	100%	138	0	0	138	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		69	69	0	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	498	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 5kV - Electrical distribution system from power gen to e-house	2750.2-E	6,100	m	0.1	1.5	10.0	15.0	26.5	610	9,150	60,947	91,500	161,597	0	61	100%	0%	0%	100%	161,597	0	0	161,597	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		53,866	53,866	53,866	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	499	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 600V - Connections from e-house to facilities	2750.3-E	5,000	m	0.1	1.5	10.0	15.0	26.5	500	7,500	49,957	75,000	132,457	0	50	100%	0%	0%	100%	132,457	0	0	132,457	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		44,152	44,152	44,152	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	0	Power Distribution System		Power Distribution System	499	In Meters	cable	Cable	Cable	Bulks	Cable		Addtitional outdoor lighting for safety (with cables) at Port Site		3,500	m	0.1	1.5	10.0	15.0	26.5	350	5,250	34,970	52,500	92,720	0	35	100%	0%	0%	100%	92,720	0	0	92,720	Type B Construction 2BC-MRY1416		2017	Direct			33%	33%	33%						0		30,907	30,907	30,907	0	0	0	0	0

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'Mary River Project - Complete Project Security Assessment - Estimate Breakdown Structure'
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - % (C&M)	Year 0+1 - %	Year 1 - % (Closure)	Year 2 - %	Year 3 - %	Year 4 - % (Post Closure)	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($) (C&M)	Year 0+1 - Cost ($)	Year 1 - Cost ($) (Closure)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($) (Post Closure)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
3000	Tote Road																																																														
3000	Tote Road	3100	General																																																												
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	504	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 1 - Demolish Building - ISO Shipping Container	3111-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	507	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 2 - Demolish Building - ISO Shipping Container	3111-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	510	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 3 - Demolish Building - ISO Shipping Container	3111-BLD-003	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	513	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 4 - Demolish Building - ISO Shipping Container	3111-BLD-004	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3112	Communications Facility No. 2	517	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 5 - Demolish Building - ISO Shipping Container	3112-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3112	Communications Facility No. 2	520	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 6 - Demolish Building - ISO Shipping Container	3112-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3112	Communications Facility No. 2	523	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 7 - Demolish Building - ISO Shipping Container	3112-BLD-003	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3112	Communications Facility No. 2	526	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 8 - Demolish Building - ISO Shipping Container	3112-BLD-004	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3113	Communications Facility No. 3	530	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 9 - Demolish Building - ISO Shipping Container	3113-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3113	Communications Facility No. 3	533	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 10 - Demolish Building - ISO Shipping Container	3113-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3113	Communications Facility No. 3	536	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 11 - Demolish Building - ISO Shipping Container	3113-BLD-003	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3130	Site Development			A4	Grade & Re-Contour Type A quarry	A4	Site Works	Grade and Re-Contour Significant Disturbed Areas		Unidentified High Priority Disturbed Areas		105,359	m2	0.0	0.2	1.9	0.6	2.72	2,005	23,113	200,549	62,669	286,096	0	0	100%	0%	0%	100%	286,096	0	0	286,096	Type A 2AM-MRY1325	Added	2015 R	Direct			50%	50%							0		143,048	143,048	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3130	Site Development			A4	Grade & Re-Contour Type A quarry	A4	Site Works	Grade and Re-Contour Significant Disturbed Areas		KM 97 Borrow Source		157,012	m2	0.0	0.2	1.9	0.6	2.7	2,989	34,445	298,870	93,394	426,708	0	0	100%	0%	0%	100%	426,708	0	0	426,708	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		213,354	213,354	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3130	Site Development			A4	Grade & Re-Contour Type A quarry	A4	Site Works	Grade and Re-Contour Significant Disturbed Areas		KM 97 Borrow Source (marginal increase in 2017)		1,000	m2	0.0	0.2	1.9	0.6	2.7	19	219	1,903	595	2,718	0	0	100%	0%	0%	100%	2,718	0	0	2,718	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		1,359	1,359	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade			Cu	Culvert Removal	cu	Site Works	Culvert Removal		Culverts - IOL		372	Ea	6.0	45.0	599.5	450.0	1,094.5	2,232	16,740	223,007	167,400	407,147	0	0	100%	0%	0%	100%	407,147	0	0	407,147	Type A 2AM-MRY1325		2014	Direct				50%	50%						0		0	203,573	203,573	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade			Cu	Culvert Removal	cu	Site Works	Culvert Removal		Culverts - Crown		11	Ea	6.0	45.0	599.5	450.0	1,094.5	66	495	6,594	4,950	12,039	0	0	0%	100%	0%	100%	0	12,039	0	12,039	Type A 2AM-MRY1325		2014	Direct				50%	50%						0		0	6,020	6,020	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Out-of-Service Tote Road		266,500	m2	0.0	0.1	1.3	0.4	1.8	3,382	38,976	338,185	105,679	482,444	0	0	100%	0%	0%	100%	482,444	0	0	482,444	Type A 2AM-MRY1325	Added	2015 R	Direct				50%	50%						0		0	241,222	241,222	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade		BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Mobile Maintenance Depot - Demolish and Decontaminate Building - Fold-away Building (Steel)		682	m2	0.6	2.4	56.0	84.1	142.4	382	1,605	38,187	57,331	97,123	1	682	0%	100%	0%	100%	0	97,123	0	97,123	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		32,374	32,374	32,374	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade		BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Mobile Maintenance Depot - Demolish floor finish - Slab on grade C/W Drainage		682	m2	0.1	1.9	12.5	18.8	33.1	85	1,279	8,518	12,788	22,584	0	0	0%	100%	0%	100%	0	22,584	0	22,584	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		7,528	7,528	7,528	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade			A5	Liner Removal	A5	Site Works	Liner Removal	Liner Removal	Mobile Maintenance Depot -Liner Removal		682	m2	0.03	0.03	3.2	0.32	3.5	22	22	2,169	217	2,386	0	0	0%	100%	0%	100%	0	2,386	0	2,386	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		795	795	795	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3132	River Crossing at STA 17			Br	Bridge Removal	Br	Site Works	Bridge Removal		Bridge Removal		1	Ea	761.9	11,428.6	76,124.5	114,285.7	201,838.8	762	11,429	76,124	114,286	201,839	5,000	5,000	0%	100%	0%	100%	0	201,839	0	201,839	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		67,280	67,280	67,280	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3133	River Crossing at STA 62			Br	Bridge Removal	Br	Site Works	Bridge Removal		Bridge Removal		1	Ea	761.9	11,428.6	76,124.5	114,285.7	201,838.8	762	11,429	76,124	114,286	201,839	5,000	5,000	100%	0%	0%	100%	201,839	0	0	201,839	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		67,280	67,280	67,280	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3134	River Crossing at STA 80			Br	Bridge Removal	Br	Site Works	Bridge Removal		Bridge Removal		1	Ea	761.9	11,428.6	76,124.5	114,285.7	201,838.8	762	11,429	76,124	114,286	201,839	5,000	5,000	100%	0%	0%	100%	201,839	0	0	201,839	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		67,280	67,280	67,280	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3135	River Crossing at STA 97			Br	Bridge Removal	Br	Site Works	Bridge Removal		Bridge Removal		1	Ea	761.9	11,428.6	76,124.5	114,285.7	201,838.8	762	11,429	76,124	114,286	201,839	5,000	5,000	100%	0%	0%	100%	201,839	0	0	201,839	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		67,280	67,280	67,280	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3136	Mary River			A3	Grade & Re-Contour	A9	Site Works	Grade and Re-Contour Building Footprints		Grade and Re-Contour Building Footprints		13,040	m2	0.0	0.1	1.3	0.4	1.8	165	1,907	16,548	5,171	23,626	0	0	100%	0%	0%	100%	23,626	0	0	23,626	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		7,875	7,875	7,875	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Borrow development areas		42,080	m2	0.0	0.1	1.3	0.4	1.8	534	6,154	53,399	16,687	76,240	0	0	100%	0%	0%	100%	76,240	0	0	76,240	Type A 2AM-MRY1325	Check	2014	Direct			33%	33%	33%						0		25,413	25,413	25,413	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q1			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q1 Quarry		64,200	m2	0.0	0.1	1.3	0.4	1.8	815	9,389	81,469	25,458	116,316	0	0	100%	0%	0%	100%	116,316	0	0	116,316	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		58,158	58,158	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q7			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q7 Quarry		53,050	m2	0.0	0.1	1.3	0.4	1.8	673	7,759	67,320	21,037	96,115	0	0	100%	0%	0%	100%	96,115	0	0	96,115	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		48,058	48,058	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q1			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q1 Quarry (addional maringal increase in 2017)		6,000	m2	0.0	0.1	1.3	0.4	1.8	76	878	7,614	2,379	10,871	0	0	100%	0%	0%	100%	10,871	0	0	10,871	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		5,435	5,435	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q11			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q11 Quarry		50,433	m2	0.0	0.1	1.3	0.4	1.8	640	7,376	63,999	19,999	91,374	0	0	100%	0%	0%	100%	91,374	0	0	91,374	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		45,687	45,687	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q11			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q18 Quarry		2,000	m2	0.0	0.1	1.3	0.4	1.8	25	293	2,538	793	3,624	0	0	100%	0%	0%	100%	3,624	0	0	3,624	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		1,812	1,812	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Borrow Source at P1			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P1 Borrow Source		75,820	m2	0.0	0.1	1.3	0.4	1.8	962	11,089	96,215	30,066	137,369	0	0	0%	100%	0%	100%	0	137,369	0	137,369	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		68,685	68,685	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q19			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q19 Quarry		18,760	m2	0.0	0.1	1.3	0.4	1.8	238	2,744	23,806	7,439	33,989	0	0	100%	0%	0%	100%	33,989	0	0	33,989	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		16,995	16,995	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q19			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q9 Quarry		15,166	m2	0.0	0.1	1.3	0.4	1.8	192	2,218	19,245	6,014	27,455	0	0	100%	0%	0%	100%	27,455	0	0	27,455	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		13,727	13,727	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q13			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q13 Quarry		6,350	m2	0.0	0.1	1.3	0.4	1.8	81	929	8,058	2,518	11,495	0	0	100%	0%	0%	100%	11,495	0	0	11,495	Type A 2AM-MRY1325	Added	2016	Direct			50%	50%							0		5,748	5,748	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q14			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q14 Quarry		13,440	m2	0.0	0.1	1.3	0.4	1.8	171	1,966	17,055	5,330	24,330	0	0	100%	0%	0%	100%	24,330	0	0	24,330	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		12,165	12,165	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q15			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q15 Quarry		10,680	m2	0.0	0.1	1.3	0.4	1.8	136	1,562	13,553	4,235	19,334	0	0	100%	0%	0%	100%	19,334	0	0	19,334	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		9,667	9,667	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q16A			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q16A Quarry		11,240	m2	0.0	0.1	1.3	0.4	1.8	143	1,644	14,263	4,457	20,348	0	0	100%	0%	0%	100%	20,348	0	0	20,348	Type A 2AM-MRY1325	Added	2016	Direct			50%	50%							0		10,174	10,174	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P5			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P5 Borrow Source		4,600	m2	0.0	0.1	1.3	0.4	1.8	58	673	5,837	1,824	8,327	0	0	100%	0%	0%	100%	8,327	0	0	8,327	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		4,164	4,164	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P6			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P6 Borrow Source		7,500	m2	0.0	0.1	1.3	0.4	1.8	95	1,097	9,517	2,974	13,577	0	0	100%	0%	0%	100%	13,577	0	0	13,577	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		6,789	6,789	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P7			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P7 Borrow Source		8,100	m2	0.0	0.1	1.3	0.4	1.8	103	1,185	10,279	3,212	14,663	0	0	100%	0%	0%	100%	14,663	0	0	14,663	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		7,332	7,332	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P8			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P8 Borrow Source		8,385	m2	0.0	0.1	1.3	0.4	1.8	106	1,226	10,640	3,325	15,179	0	0	100%	0%	0%	100%	15,179	0	0	15,179	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		7,590	7,590	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P10			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P10 Borrow Source		19,344	m2	0.0	0.1	1.3	0.4	1.8	245	2,829	24,547	7,671	35,018	0	0	100%	0%	0%	100%	35,018	0	0	35,018	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		17,509	17,509	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P13			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P13 Borrow Source		8,456	m2	0.0	0.1	1.3	0.4	1.8	107	1,237	10,731	3,353	15,308	0	0	100%	0%	0%	100%	15,308	0	0	15,308	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		7,654	7,654	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P15			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Removal of Quarry and Borrow No Longer being Developed (Q9, Q14, Q15, P5, P6,		-102,131	m2	0.0	0.1	1.3	0.4	1.8	-1,296	-14,937	-129,603	-40,500	-184,887	0	0	100%	0%	0%	100%	-184,887	0	0	-184,887	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		-92,444	-92,444	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P14			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P14 Borrow Source		3,160	m2	0.0	0.1	1.3	0.4	1.8	40	462	4,010	1,253	5,721	0	0	100%	0%	0%	100%	5,721	0	0	5,721	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		2,860	2,860	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P15			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P15 Borrow Source		3,300	m2	0.0	0.1	1.3	0.4	1.8	42	483	4,188	1,309	5,974	0	0	100%	0%	0%	100%	5,974	0	0	5,974	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		2,987	2,987	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Borrow Source at Km 2			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Km 2 Borrow source		41,795	m2	0.0	0.1	1.3	0.4	1.8	530	6,113	53,037	16,574	75,723	0	0	100%	0%	0%	100%	75,723	0	0	75,723	Type A 2AM-MRY1325	Check	2015	Direct			100%								0		75,723	0	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Borrow Source at Km 2			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Km 2 Borrow source (marginal increase in 2017)		1,000	m2	0.0	0.1	1.3	0.4	1.8	13	146	1,269	397	1,812	0	0	100%	0%	0%	100%	1,812	0	0	1,812	Type A 2AM-MRY1325	Added	2017	Direct			100%								0		1,812	0	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Unidentified Borrow Sources			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Unidentified Borrow Sources		697,910	m2	0.0	0.1	1.3	0.4	1.8	8,856	102,069	885,640	276,753	1,263,423	0	0	100%	0%	0%	100%	1,263,423	0	0	1,263,423	Type A 2AM-MRY1325	Added	2015 R	Direct			50%	50%							0		631,712	631,712	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3139	Infrastructure Pads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Explosive magazine pads along Tote Road		760	m2	0.0	0.1	1.3	0.4	1.8	10	111	964	301	1,377	0	0	100%	0%	0%	100%	1,377	0	0	1,377	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		459	459	459	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3139	Infrastructure Pads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown at km 61		6,000	m2	0.0	0.1	1.3	0.4	1.8	76	878	7,614	2,379	10,862	0	0	100%	0%	0%	100%	10,862	0	0	10,862	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		3,621	3,621	3,621	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	565	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Emergency Shelter No. 1 - Demolish Building - ISO Shipping Container	3160-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	566	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Shelter No. 1 - Demolish and foundations - Timber Cribbing to Elevate Building	3160-BLD-001	15	m2	0.1	1.2	7.8	11.8	20.8	2	18	117	175	309	0	4	100%	0%	0%	100%	309	0	0	309	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		103	103	103	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	568	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Emergency Shelter No. 2 - Demolish Building - ISO Shipping Container	3160-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	569	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Shelter No. 2 - Demolish and foundations - Timber Cribbing to Elevate Building	3160-BLD-002	15	m2	0.1	1.2	7.8	11.8	20.8	2	18	117	175	309	0	4	100%	0%	0%	100%	309	0	0	309	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		103	103	103	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	571	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Emergency Shelter No. 3 - Demolish Building - ISO Shipping Container	3160-BLD-003	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	572	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Shelter No. 3 - Demolish and foundations - Timber Cribbing to Elevate Building	3160-BLD-003
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	574	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Emergency Shelter No. 4 - Demolish Building - ISO Shipping Container	3160-BLD-004
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	575	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Shelter No. 4 - Demolish and foundations - Timber Cribbing to Elevate Building	3160-BLD-004

ID CODE	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)
572	15	m2	0.1	1.2	7.8	11.8	20.8	2	18	117	175	309	0	4	100%	0%	0%	100%	309	0	0	309
574	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
575	15	m2	0.1	1.2	7.8	11.8	20.8	2	18	117	175	309	0	4	100%	0%	0%	100%	309	0	0	309

					C&M		Closure			Post Closure					C&M		Closure			Post Closure				
ID CODE	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
572	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		103	103	103	0	0	0	0	0
574	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
575	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		103	103	103	0	0	0	0	0

Baffinland
'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site																																																														
4000	Mine Site	4100	General																																																												
4000	Mine Site	4100	General	4110	Communication and IT Infrastructure	4110	Communication and IT Infrastructure	**579**	**BLD**	**FF4**	ISO Container	**FC**	**Buildings (Not Contaminated)**	**ISO Shipping Containers**		Communication Shed No. 1 - Demolish Building - ISO Shipping Container	4110-BLD-001	15	m2	**0.1**	**1.7**	**11.2**	**16.8**	29.7	**2**	**25**	**167**	**250**	442	**1**	**15**	**100%**	**0%**	**0%**	**100%**	442	0	0	442	Type A 2AM-MRY1325		2014	**Direct**			**33%**	**33%**	**33%**						0		147	147	147	0	0	0	0	0
4000	Mine Site	4100	General	4110	Communication and IT Infrastructure	4110	Communication and IT Infrastructure	582	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 2 - Demolish Building - ISO Shipping Container	4110-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Construction Laydown Area		33,576	m2	0.0	0.1	1.3	0.4	1.8	426	4,910	42,608	13,314	60,832	0	0	100%	0%	0%	100%	60,832	0	0	60,832	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		20,277	20,277	20,277	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Existing Laydown Area		17,367	m2	0.0	0.1	1.3	0.4	1.8	220	2,540	22,038	6,887	31,465	0	0	100%	0%	0%	100%	31,465	0	0	31,465	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		10,488	10,488	10,488	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Additional laydown next to Hatch old office/carpentry shack		11,250	m2	0.0	0.1	1.3	0.4	1.8	143	1,645	14,276	4,461	20,366	0	0	100%	0%	0%	100%	20,366	0	0	20,366	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		6,789	6,789	6,789	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4133	Ore Crushing and Loading			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Crusher extension Pad		36,180	m2	0.01	0.1	1.3	0.4	1.8	459	5,291	45,912	14,347	65,496	0	0	100%	0%	0%	100%	65,496	0	0	65,496	Type A 2AM-MRY1325		2015 A	Direct			33%	33%	33%						0		21,832	21,832	21,832	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4133	Ore Crushing and Loading			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Crusher Pad Expansion		25,700	m2	0.01	0.1	1.3	0.4	1.8	326	3,759	32,613	10,191	46,525	0	0	100%	0%	0%	100%	46,525	0	0	46,525	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		15,508	15,508	15,508	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4136	Tote Road			A3	Grade & Re-Contour	A9	Site Works	Grade and Re-Contour Building Footprints		Grade and Re-Contour Building Footprints		223	m2	0.0	0.1	1.3	0.4	1.8	3	33	283	88	404	0	0	100%	0%	0%	100%	404	0	0	404	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		135	135	135	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry		258,580	m2	0.0	0.1	1.3	0.4	1.8	3,281	37,817	328,135	102,539	468,491	0	0	100%	0%	0%	100%	468,491	0	0	468,491	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		234,245	234,245	0	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry (additional marginal inrease in 2017)		6,000	m2	0.0	0.1	1.3	0.4	1.8	76	878	7,614	2,379	10,871	0	0	100%	0%	0%	100%	10,871	0	0	10,871	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		5,435	5,435	0	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	D1Q1 Quarry		66,978	m2	0.0	0.1	1.3	0.4	1.8	850	9,796	84,994	26,560	121,350	0	0	100%	0%	0%	100%	121,350	0	0	121,350	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		60,675	60,675	0	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	D1Q2 Quarry		109,807	m2	0.0	0.1	1.3	0.4	1.8	1,393	16,059	139,344	43,543	198,947	0	0	100%	0%	0%	100%	198,947	0	0	198,947	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		99,473	99,473	0	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Site Roads		80,899	m2	0.0	0.1	1.3	0.4	1.8	1,027	11,831	102,660	32,080	146,571	0	0	100%	0%	0%	100%	146,571	0	0	146,571	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		48,857	48,857	48,857	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Waste Rock Road		20,000	m2	0.0	0.1	1.3	0.4	1.8	254	2,925	25,380	7,931	36,236	0	0	100%	0%	0%	100%	36,236	0	0	36,236	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		12,079	12,079	12,079	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Site Roads		1,120	m2	0.0	0.1	1.3	0.4	1.8	14	164	1,421	444	2,028	0	0	100%	0%	0%	100%	2,028	0	0	2,028	Type A 2AM-MRY1325		2015 A	Direct			33%	33%	33%						0		676	676	676	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT012	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT013	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT014	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT015	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT016	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT017	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT018	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT019	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT020	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT021	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT022	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT023	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT024	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT025	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT026	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT027	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT028	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT029	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT030	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT035	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT036	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT037	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT038	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT040	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT041	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		END DUMP TRAILER	EDT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 AMBULANCE	EMG003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F450 AMBULANCE	EMG004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		HAGGLUNDS SNOW RESCUE VEHICLE	EMG007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT CATERPILLAR P20000	FKT001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT CATERPILLAR P10000	FKT005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT/MANLIFT CROWN WAV50-118	FKT010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLAMELESS SPARKLESS HEATER	FSH003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLAMELESS SPARKLESS HEATER	FSH004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GROUND SURFACE HEATER	GTH001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HIBOY TRAILER	HBT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HIBOY TRAILER	HBT002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HIBOY TRAILER	HBT003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HIBOY TRAILER	HBT004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HI BOY TRAILER	HBT005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		PETERBILT SERVICE TRUCK 2014	HTP014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FREIGHTLINER VAC TRUCK	HTP018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FREIGHTLINER M2 SERVICE TRUCK	HTP022	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Grader		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777 Haul Truck		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		D10 Dozer		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	3rd Party Heavy Mobile Equipment (make up for typical fleet)		3	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	39	360	3,897	3,600	7,857	96	288	100%	0%	0%	100%	7,857	0	0	7,857	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		2,619	0	2,619	0	0	0	0	2,619
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Ore Haul Truck		8	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	104	960	10,391	9,600	20,951	96	768	100%	0%	0%	100%	20,951	0	0	20,951	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		6,984	0	6,984	0	0	0	0	6,984

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Fuel/ Lube Truck		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Telehandler		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Zoom Boom		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Excavator		2	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	26	240	2,598	2,400	5,238	96	192	100%	0%	0%	100%	5,238	0	0	5,238	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,746	0	1,746	0	0	0	0	1,746
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GENIE MANLIFT / Z45/25J (BURNED)	JLG004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GENIE MANLIFT / Z45/25J	JLG005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		JLG MANLIFT 450AJ	JLG010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLOAT TRAILER SCHELTENA	LBT003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		Passenger Bus		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		B-Train Trailer (for Ore Haul Truck)		8	Ea	10.0	45.0	999.1	450.0	1,494.1	80	360	7,993	3,600	11,953	24	192	100%	0%	0%	100%	11,953	0	0	11,953	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		3,984	0	3,984	0	0	0	0	3,984
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		Mechanics Truck (with compressor and crane)		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLOAT TRAILER MINI DECK SCHELTENA MD1	LBT003-01	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Large Forklift		2	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	26	240	2,598	2,400	5,238	96	192	100%	0%	0%	100%	5,238	0	0	5,238	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,746	0	1,746	0	0	0	0	1,746
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		950H SNOW REMOVAL LOADER	LDR018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP013	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP014	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP016	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP017	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP020	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP021	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP024	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP025	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP027	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP029	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2008	LTP030	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TOYOTA 4X4 PICK-UP LAND CRUISER	LTP031	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2008	LTP033	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TOYOTA 4X4 PICK UP LAND CRUISER	LTP034	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2011	LTP038	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2013	LTP040	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick Up	Pick Up Truck		6	Ea	6.7	25.0	666.1	250.0	941.1	40	150	3,997	1,500	5,647	4	24	100%	0%	0%	100%	5,647	0	0	5,647	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,882	0	1,882	0	0	0	0	1,882
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2013	LTP043	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP044	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP045	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP046	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP047	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP056	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP057	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2014	LTP058	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP059	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP060	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 CREW CAB 4X4 2010- LEVITT SAFETY	LTP063	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		3500 GMC CREW CAB 4X4 2006	LTP067	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GMC 2500 MOBILE STAIR TRUCK	MST001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		F750 DE-ICEING TRUCK BBS-97	MTP001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 DECK TRUCK	MTP002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 DECK TRUCK	MTP004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 WELDING TRUCK	MTP005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013	MTP007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 CUBE VAN	MTP008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 (BLASTERS)	MTP009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013	MTP010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SERVICE TRUCK FOUNTAIN TIRE	MTP011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2014	MTP012	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SERVICE TRUCK	MTP013	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2015	MTP014	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F650 SERVICE TRUCK 2003	MTP015	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F-550 SERVICE TRUCK FOUNTAIN TIRE	MTP016	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PULL- TYPE PNEUMATIC ROLLER	PTR001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PULL-TYPE PNEUMATIC TIRE ROLLER	PTR002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE VAC TANK UNIT	PVT001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE VACUUM TANK c/w PUMP	PVT002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE VAC TANK UNIT	PVT003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP 6"	PWP001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP	PWP002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP 4"	PWP003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP - CAT-PAC	PWP004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 277 MULTI TERRAIN	SKD005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 299D	SKD008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 262D Rubber Tire	SKD012	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 03	SKJ003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 10	SKJ010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TUNDRA SKIDOO	SNM003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKANDIK WT 600	SNM004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKANDIK WT 600	SNM005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKANDIC ACE 600 SNOWMOBILE	SNM006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKANDIC ACE 600 SNOWMOBILE	SNM007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE CAN AM COMMANDER 800XT	SXS001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT TRACKED	SXS008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TIRE MANIPULATOR	TMN001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER ENCLOSED SNOWMOBILE	TRL001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		BOAT TRAILER	TRL002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER MILLER AIR PAK	WLD001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER MILLER AIR PAK	WLD002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		24 PASSENGER BUS	BUS001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		48 PASSENGER BUS	BUS002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		24 PASSENGER BUS	BUS003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		48 PASSENGER BUS	BUS004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		48 PASSENGER BUS	BUS005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		MANUAL JIB CRANE MOBILE MAINTENANCE SHOP	CRN007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		DX800 SANDVIK ROCK DRILL	DRL001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		DX800 SANDVIK ROCK DRILL	DRL002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		DX780 SANDVIK ROCK DRILL	DRL005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		DX800 SANDVIK ROCK DRILL	DRL006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D9T CATERPILLAR DOZER	DZR006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D9T CATERPILLAR DOZER	DZR007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D5M CATERPILLAR DOZER	DZR009	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D4C CATERPILLAR DOZER LPGIII	DZR010	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		824H CATERPILLAR RUBBER TIRED DOZER	DZR011	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D9T CATERPILLAR DOZER	DZR012	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		STERLING SPILL RESPONSE UNIT 2002	EMG005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		STERLING SPILL RESPONSE UNIT 2002	EMG006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2013 K/W FUEL LUBE TRUCK	FLT001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2014K/W FUEL LUBE TRUCK	FLT002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2014 MACK JET FUEL TRUCK	FLT003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		SUPER B FUEL TANKER LEAD UNIT	FLT004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR TRACTOR	FLT005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TRI AXLE FUEL TRAILER	FLT006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		SUPER B FUEL TRAILER PUP UNIT	FLT007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B FUEL/LUBE TRUCK	FLT010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FREIGHTLINER M2 FUEL TRUCK	FLT011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TRI AXLE WATER TRUCK	HTP004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT ROAD MAINTENANCE 2013	HTP005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		STERLING BOOM TRUCK W/ MANITEX CRANE	HTP006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		STERLING BOOM TRUCK W/ MANITEX CRANE	HTP007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT 367 TRACTOR 2017	HTP009	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		KENWORTH TOW TRUCK	HTP010	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT TRACTOR 2014	HTP011	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT TRACTOR 2014	HTP013	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT ROLL OFF TRUCK	HTP015	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		INTERNATIONAL PLOW TRUCK	HTP016	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		INTERNATIONAL BOOM TRUCK KNUCKLE	HTP019	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR 4900 2014 (NFLD HARD ROCK)	HTP024	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR 4900 2014 (NFLD HARD ROCK)	HTP025	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR TRACTOR	HTP029	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR TRACTOR	HTP032	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WESTERN STAR TRACTOR	HTP033	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT	JLG007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		GENIE BOOM LIFT ZOOM BOOM Z60/34	JLG008	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		KUBOTA TRACTOR B7800	KUB004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		LOWBOY TRAILER DELOUPE	LBT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		LOWBOY TRAILER DELOUPE	LBT002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		CS74 SMOOTH ROLLER	RLR002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TH514	TLH002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TH514	TLH003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TH514	TLH004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TL642	TLH005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TRAILER LIVE BOTTOM	WBT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING WATER/SAND TRUCK	AWT001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING WATER TRUCK	AWT002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		CONTAINER HANDLER	CNH001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		CARGO LUGGAGE HANDLER	CNH003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TEREX RT780 CRANE	CRN002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TEREX RT130 CRANE	CRN003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MANITOWOC CRANE MODEL 2250	CRN004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MOBILE SPYDER CRANE W706	CRN006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		BOOM CRANE, CONMA, MTP016	CRN008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TAMROCK RANDER 800-2 HYDRAULIC DRILL 200	DRL003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MD6290 CAT ROTARY PRODUCTION DRILL	DRL004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MD6290 CAT ROTARY PRODUCTION DRILL	DRL007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		OSHKOSH FIRE TRUCK 1993 -T1500 MR	EMG002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		390DL EXCAVATOR CATERPILLAR	EXC001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		390DL EXCAVATOR CATERPILLAR	EXC002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		345DL EXCAVATOR CATERPILLAR	EXC003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		345DL EXCAVATOR CATERPILLAR	EXC005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		345DL EXCAVATOR CATERPILLAR	EXC006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PC09-1 EXCAVATOR KOMATSU MINI	EXC008	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		M320F EXCAVATOR CATERPILLAR RUBBER TIRE	EXC009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		16H CATERPILLAR GRADER	GRD001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		16M CATERPILLAR GRADER	GRD002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		14M CATERPILLAR GRADER	GRD003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		14M CATERPILLAR GRADER W/WING	GRD004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		14M CATERPILLAR GRADER	GRD005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		14M CATERPILLAR GRADER W/WING	GRD006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		992K WHEEL LOADER	LDR001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		930K WHEEL LOADER	LDR012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		930K WHEEL LOADER	LDR013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		930K WHEEL LOADER	LDR014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		930K WHEEL LOADER	LDR015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		IT14 LOADER NFLD HARDROCK	LDR019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		906 CATERPILLAR LOADER	LDR020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		VOLVO L-180 LOADER - W/TIRE MANIPULATOR	LDR021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINE HAUL TRUCK	MHT001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINE HAUL TRUCK	MHT002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINE HAUL TRUCK	MHT003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINE HAUL TRUCK	MHT004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

Baffinland

'Mary River Project - Complete Project Security Assessment - Estimate Breakdown Structure'
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub-system	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT022	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT023	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT024	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT025	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT026	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT027	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT028	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT029	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT030	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT031	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT032	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT033	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT034	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT035	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT036	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT037	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT038	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT039	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1022	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1023	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1024	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1025	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1026	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1027	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1028	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1029	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1030	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1031	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1032	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1033	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1034	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1035	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1036	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1037	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1038	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1039	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2022	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2023	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2024	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2025	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2026	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2027	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2028	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2029	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2030	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2031	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2032	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2033	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2034	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2035	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2036	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2037	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2038	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL PUP TRAILER	OHT2039	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SNOW BLOWER VOHL DV4000	SBL002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SNOW BLOWER VOHL DV4000	SBL003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Mobile Light Plant		5	Ea	10.0	45.0	999.1	450.0	1,494.1	50	225	4,996	2,250	7,471	24	120	100%	0%	0%	100%	7,471	0	0	7,471	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		2,490	0	2,490	0	0	0	0	2,490
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Pick-Up Truck		7	Ea	6.7	25.0	666.1	250.0	941.1	47	175	4,663	1,750	6,588	4	28	100%	0%	0%	100%	6,588	0	0	6,588	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		2,196	0	2,196	0	0	0	0	2,196
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Flat Deck Truck		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Truck Wash Facility		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Mini-Crane		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Boom Truck		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Container Handler		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Gantry Crane		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Passenger Bus		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Track Dozer, D9		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Mine Haul Truck, 777		3	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	39	360	3,897	3,600	7,857	96	288	100%	0%	0%	100%	7,857	0	0	7,857	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		2,619	0	2,619	0	0	0	0	2,619
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Single Pass Production Drill		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Shovel 6030		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Integrated Tool Carrier, 938		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	RESCUE UNIT		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	MECHANICS TRUCK,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	SKELETON TRAILER,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	FREIGHT HAUL TRACTOR ,		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	WATER TRUCK		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	MAINTENANCE FUEL/LUBE TRUCK ,		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Ore Haul Truck Workshop		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		LOADER VOLVO-L-180E C/W TIRE HANDLER & 3 CRATES IN CAB		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		53' POWER TRAILER		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		F550 FLAT DECK PICK-UP WHITE VIN# 1FDOW5HTOFED33588		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		1650 GAL. VERTICAL STORAGE TANK		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		1650 GAL. VERTICAL STORAGE TANK		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		1650 GAL. VERTICAL STORAGE TANK + BOX PLASTIC FITTINGS		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		STEP-DECK TRAILER 3 AXLES UNIT # 533F650		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TRACTOR FRTL CABOVER UNIT 512109		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		SMITHCO SIDE DUMP TRAILER MODEL HDT 4-38-23, S/N 712377		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		HP 400RD PLANT CRUSHER S/N MC-0401/MC2015102		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		C 125 JAW CRUSHER		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FORD F650 SERVICE TRUCK VIN# 3FDNF65H13MB00286		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		GMC PICK UP 4WD + TOOL/JOB BOX VIN# 1GTHK39D17E173219		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE TRAILER OFF-ROAD MINE MODEL HDT4-38-23 S/N 712379		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE SIDE DUMP TRAILER MODEL HDT4-38-23 S/N 712385		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE SIDE-DUMP TRAILER MODEL HDT4-38-23, S/N 712381		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK + 10 SPARE TIRES STRAPPED ON TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712393		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712387		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712391		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712389		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		UTILITY TRAILERS STACKED 2 HIGH		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712395		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M: Year 0 - %	C&M: Year 0+1 - %	Closure: Year 1 - %	Closure: Year 2 - %	Closure: Year 3 - %	Post Closure: Year 4 - %	Post Closure: Year 5 - %	Post Closure: Year 6 - %	Post Closure: Year 7 - %	Post Closure: Year 8 - %	C&M: Year 0 - Cost ($)	C&M: Year 0+1 - Cost ($)	Closure: Year 1 - Cost ($)	Closure: Year 2 - Cost ($)	Closure: Year 3 - Cost ($)	Post Closure: Year 4 - Cost ($)	Post Closure: Year 5 - Cost ($)	Post Closure: Year 6 - Cost ($)	Post Closure: Year 7 - Cost ($)	Post Closure: Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL TRAILER (FRONT) SERIAL # 712383		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712399		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712401		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITH SIDE-DUMP TRAILER, SERIAL # 712403		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK (2 PALLETS STRAPPED ON TRUCK)		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK (OHT031)		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2011 KENWORTH S/A MECHANICS SERVICE TRUCK VIN# 2NKHHM6X1BM284136		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2007 FREIGHTLINER M2 4X4 VIN# 1FVDCXDC47HX81790		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SANDVIK QA441 SCREENER S/N # QA44100342		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SANDVIK NEW QJ341 JAW CRUSHER S/N# QJ34100262		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		BRODERSON 16 80 CRANE		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL # 712397		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equip+H1825ment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712405		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712378		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL #712388		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2005 WESTERN STAR VIN# 1XKCPBEX85R980272		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		V SNOW PLOW VIN# 9900-2564		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 CAT 14M GRADER YELLOW VIN# 8814WKR9J88448		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2012 CAT 14M GRADER YELLOW		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2006 TRAILER TRIAXLE GREY VIN# LA90735316A003393 * RECEIVED WITH DAMAGE TO HYDROLIC OIL SUPPLY FITTING*		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WINCH TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TRAILER DUMP TRUCK TRIAXLE S/N# 2ATE060336A003392		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712382		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712392		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712390		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712380		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712398		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL# 712394		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712384		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL #712402		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL #712400		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712396		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL #712406 * damaged by stevedores during receiving (hydraulic fittings in front of trailer)		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WETSERN STAR TRUCK VIN: 5KJRASD19GPHD7171		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD14GPHD7174		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD12GPHD7173		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712404		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712386		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD10GPHD7172		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4200	Mine																																																												
4000	Mine Site	4200	Mine	4210	Explosives Facility	4211	Explosives Plant Building	769	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Explosives Plant Building - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4211-BLD-001	342	m2	0.6	3.4	56.0	84.1	143.4	192	1,150	19,150	28,750	49,050	1	342	100%	0%	0%	100%	49,050	0	0	49,050	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		16,350	16,350	16,350	0	0	0	0	0
4000	Mine Site	4200	Mine	4210	Explosives Facility	4212	Explosives Shop	773	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Explosives Shop - Demolish and Decontaminate Building - Fold-away Building (Steel)	4212-BLD-001	372	m2	0.6	2.4	56.0	84.1	142.4	208	875	20,815	31,250	52,940	1	372	100%	0%	0%	100%	52,940	0	0	52,940	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		17,647	17,647	17,647	0	0	0	0	0
4000	Mine Site	4200	Mine	4210	Explosives Facility	4212	Explosives Shop	775	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Explosives Shop - Demolish floor finish - Slab on grade C/W Drainage	4212-BLD-001	372	m2	0.1	1.9	12.5	18.8	33.1	46	697	4,643	6,970	12,310	0	0	100%	0%	0%	100%	12,310	0	0	12,310	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		4,103	4,103	4,103	0	0	0	0	0
4000	Mine Site	4200	Mine	4210	Explosives Facility	4213	Explosives Magazines	777	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Explosives Magazines - Demolish and Decontaminate Building - Trailer - Single	4213-BLD-001	33	m2	0.6	3.4	56.0	84.1	143.4	19	113	1,873	2,813	4,798	1	33	100%	0%	0%	100%	4,798	0	0	4,798	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,599	1,599	1,599	0	0	0	0	0
4000	Mine Site	4200	Mine	4220	Haul Roads	4222	Explosive pad haul road			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Explosive pad haul road		19,600	m2	0.0	0.1	1.3	0.4	1.8	249	2,867	24,872	7,772	35,511	0	0	100%	0%	0%	100%	35,511	0	0	35,511	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		11,837	11,837	11,837	0	0	0	0	0
4000	Mine Site	4200	Mine	4230	Waste Rock Dump	4230	Waste Rock Dump			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Waste Rock Dump		190,000	m2	0.0	0.1	1.3	0.4	1.8	2,411	27,788	241,108	75,344	190,000	0	0	100%	0%	0%	100%	190,000	0	0	190,000	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		63,333	63,333	63,333	0	0	0	0	0
4000	Mine Site	4200	Mine	4230	Waste Rock Pond	4230	Waste Rock Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner	Grade and Contour	Waste Rock Pond		6,000	m2	0.0	0.2	4.4	0.7	5.3	267	1,068	26,694	4,287	32,050	0	0	100%	0%	0%	100%	32,050	0	0	32,050	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		10,683	10,683	10,683	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Pit 1		55,000	m2	0.0	0.1	1.3	0.4	1.8	698	8,044	69,794	21,810	99,648	0	0	100%	0%	0%	100%	99,648	0	0	99,648	Type A 2AM-MRY1325		2015	Direct			50%	50%							0		49,824	49,824	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Pit 1 - Marginal increase		214,450	m2	0.0	0.1	1.3	0.4	1.8	2,721	31,363	272,134	85,039	388,218	0	0	100%	0%	0%	100%	388,218	0	0	388,218	Type A 2AM-MRY1325	Added	2015 R	Direct			50%	50%							0		194,109	194,109	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		PWSP	PWSP-1	3,720	m2	0.0	0.2	4.4	0.7	5.3	166	662	16,550	2,658	19,747	0	0	100%	0%	0%	100%	19,747	0	0	19,747	Type A 2AM-MRY1325	Modified	2015 R	Direct				100%							0		0	19,747	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		PWSP	PWSP-2	6,967	m2	0.0	0.2	4.4	0.7	5.3	310	1,240	30,996	4,978	36,983	0	0	100%	0%	0%	100%	36,983	0	0	36,983	Type A 2AM-MRY1325	Modified	2015 R	Direct				100%							0		0	36,983	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		PWSP	PWSP-3	6,511	m2	0.0	0.2	4.4	0.7	5.3	290	1,159	28,967	4,652	34,562	0	0	100%	0%	0%	100%	34,562	0	0	34,562	Type A 2AM-MRY1325	Modified	2015 R	Direct				100%							0		0	34,562	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	786	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Pit Office Building - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4281-BLD-001	268	m2	0.2	3.4	22.4	33.6	59.4	60	900	5,995	9,000	15,895	1	268	100%	0%	0%	100%	15,895	0	0	15,895	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,298	5,298	5,298	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	787	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Pit Office Building - Demolish and foundations - Timber Cribbing to Elevate Building	4281-BLD-001	268	m2	0.1	1.2	7.8	11.8	20.8	33	315	2,098	3,150	5,563	0	80	100%	0%	0%	100%	5,563	0	0	5,563	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,854	1,854	1,854	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	789	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Pit Office Washcar - Demolish and Decontaminate Building - Trailer - Single	4281-BLD-002	45	m2	0.2	3.4	22.4	33.6	59.4	10	150	999	1,500	2,649	1	45	100%	0%	0%	100%	2,649	0	0	2,649	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		883	883	883	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	009	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Geology 'core' building - Demolish and Decontaminate Building - Trailer - Single	4000-BLD-GEO-001	72	m2	0.2	3.4	22.4	33.6	59.4	16	242	1,613	2,421	4,276	1	72	100%	0%	0%	100%	4,276	0	0	4,276	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		1,425	1,425	1,425	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	009	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Geology 'core' building - Demolish and Decontaminate Building - Trailer - Single	4000-BLD-GEO-002	54	m2	0.2	3.4	22.4	33.6	59.4	12	182	1,209	1,816	3,207	1	54	100%	0%	0%	100%	3,207	0	0	3,207	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		1,069	1,069	1,069	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	009	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Geology 'core' building - Demolish and Decontaminate Building - Trailer - Single	4000-BLD-GEO-003	36	m2	0.2	3.4	22.4	33.6	59.4	8	121	806	1,211	2,138	1	36	100%	0%	0%	100%	2,138	0	0	2,138	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		713	713	713	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	009	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Geology 'core' building - Demolish and Decontaminate Building - Trailer - Single	4000-BLD-GEO-004	25	m2	0.2	3.4	22.4	33.6	59.4	6	84	560	841	1,485	1	25	100%	0%	0%	100%	1,485	0	0	1,485	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		495	495	495	0	0	0	0	0
4000	Mine Site	4300	Material Handling																																																														
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Ore Stockpiles		5,100	m2	0.0	0.1	1.3	0.4	1.8	65	746	6,472	2,022	9,241	0	0	100%	0%	0%	100%	9,241	0	0	9,241	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,080	3,080	3,080	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Ore crushing and Loading Pad, Utility & Accomodation Pads		121,021	m2	0.0	0.1	1.3	0.4	1.8	1,536	17,699	153,574	47,990	219,264	0	0	100%	0%	0%	100%	219,264	0	0	219,264	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		73,088	73,088	73,088	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System	795	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Crushing & Screening Electrical Trailer - Demolish and Decontaminate Building - Special Modular / Prefabricated	4381-BLD-001	39	m2	0.6	3.4	56.0	84.1	143.4	22	133	2,206	3,313	5,651	1	39	100%	0%	0%	100%	5,651	0	0	5,651	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,884	1,884	1,884	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System	798	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Crushing & Screening Electrical Trailer - Demolish and Decontaminate Building - Special Modular / Prefabricated	4381-BLD-002	39	m2	0.6	3.4	56.0	84.1	143.4	22	133	2,206	3,313	5,651	1	39	100%	0%	0%	100%	5,651	0	0	5,651	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,884	1,884	1,884	0	0	0	0	0

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		AIM	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Control Room	Spread A, Control Room	MR-PRO-CRU-010-COR01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Fine Discharge	Spread A, Fine Discharge	MR-PRO-CRU-010-FID01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Lumps Discharge	Spread A, Lumps Discharge	MR-PRO-CRU-010-LUD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Secondary Cone Feed	Spread A, Secondary Cone Feed	MR-PRO-CRU-010-PCF01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		BAE	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread A, Primary Jaw Plant	Spread A, Primary Jaw Plant	MR-PRO-CRU-010-PJP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Primary Screen Plant Discharge	Spread A, Primary Screen Plant Discharge	MR-PRO-CRU-010-PSD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Primary Screen Plant	Spread A, Primary Screen Plant	MR-PRO-CRU-010-PSP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Secondary Cone Plant	Spread A, Secondary Cone Plant	MR-PRO-CRU-010-SCP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Tertiary Cone Plant	Spread A, Tertiary Cone Plant	MR-PRO-CRU-010-TCP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Twin Screen Plant	Spread A, Twin Screen Plant	MR-PRO-CRU-010-TSP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		AIM	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Control Room	Spread B, Control Room	MR-PRO-CRU-020-COR01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Fine Discharge	Spread B, Fine Discharge	MR-PRO-CRU-020-FID01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Chain Conveyor	Chain Conveyor (1 for under jaw crusher, 1 for under crusher bin)		2	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	38	426	3,837	4,260	8,523	1	2	100%	0%	0%	100%	8,523	0	0	8,523	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		2,841	0	2,841	0	0	0	0	2,841
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Lumps Discharge	Spread B, Lumps Discharge	MR-PRO-CRU-020-LUD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Secondary Cone Feed	Spread B, Secondary Cone Feed	MR-PRO-CRU-020-PCF01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		BAE	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread B, Primary Jaw Plant	Spread B, Primary Jaw Plant	MR-PRO-CRU-020-PJP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Primary Screen Plant Discharge	Spread B, Primary Screen Plant Discharge	MR-PRO-CRU-020-PSD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Primary Screen Plant	Spread B, Primary Screen Plant	MR-PRO-CRU-020-PSP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Secondary Cone Plant	Spread B, Secondary Cone Plant	MR-PRO-CRU-020-SCP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Tertiary Cone Plant	Spread B, Tertiary Cone Plant	MR-PRO-CRU-020-TCP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Twin Screen Plant	Spread B, Twin Screen Plant	MR-PRO-CRU-020-TSP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Fine Discharge	Spread C, Fine Discharge	MR-PRO-CRU-030-FID01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Lumps Discharge	Spread C, Lumps Discharge	MR-PRO-CRU-030-LUD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Secondary Cone Feed	Spread C, Secondary Cone Feed	MR-PRO-CRU-030-PCF01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		BAE	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread C, Primary Jaw Plant	Spread C, Primary Jaw Plant	MR-PRO-CRU-030-PJP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Primary Screen Plant Discharge	Spread C, Primary Screen Plant Discharge	MR-PRO-CRU-030-PSD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Primary Screen Plant	Spread C, Primary Screen Plant	MR-PRO-CRU-030-PSP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Secondary Cone Plant	Spread C, Secondary Cone Plant	MR-PRO-CRU-030-SCP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Tertiary Cone Plant	Spread C, Tertiary Cone Plant	MR-PRO-CRU-030-TCP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Twin Screen Plant	Spread C, Twin Screen Plant	MR-PRO-CRU-030-TSP01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4382	Truck Weigh Facility			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Truck Weigh Facility disturbed area		13,000	m2	0.0	0.1	1.3	0.4	1.8	165	1,901	16,497	5,155	23,553	0	0	100%	0%	0%	100%	23,553	0	0	23,553	Type A 2AM-MRY1325	Check	2015	Direct			100%								0		23,553	0	0	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4382	Truck Weigh Facility	820	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Truck Weigh Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4382-BLD-001	335	m2	0.6	2.4	56.0	84.1	142.4	188	788	18,734	28,125	47,646	1	335	100%	0%	0%	100%	47,646	0	0	47,646	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		15,882	15,882	15,882	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4382	Truck Weigh Facility	821	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Truck Weigh Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4382-BLD-001	335	m2	0.1	2.2	14.5	21.8	38.5	49	729	4,854	7,287	12,870	1	251	100%	0%	0%	100%	12,870	0	0	12,870	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		4,290	4,290	4,290	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4385	Crushing Stockpile Settling Pond	828	In Meters	piping	Piping	Piping	Bulks	Piping		Stockpile Drain Pipe - Piping Installation - Ore stockpile to effluent pond and Mary River	4385.1-P	5,220	m	0.3	3.8	25.0	37.5	66.2	1,305	19,575	130,387	195,750	345,712	0	52	100%	0%	100%	0%	345,712	0	345,712	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		115,237	115,237	115,237	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4385	Crushing Stockpile Settling Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Ore Crushing Sedimentation Pond		6,429	m2	0.0	0.2	4.4	0.7	5.3	286	1,145	28,601	4,594	34,339	0	0	100%	0%	0%	100%	34,339	0	0	34,339	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		11,446	11,446	11,446	0	0	0	0	0
4000	Mine Site	4400	Aerodrome																																																												
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4430	Aerodrome Facilities			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Heli Pad		5,776	m2	0.0	0.1	1.3	0.4	1.8	73	845	7,330	2,290	10,465	0	0	100%	0%	0%	100%	10,465	0	0	10,465	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,488	3,488	3,488	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4431	Aerodrome Office	833	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Aerodrome Office - Demolish and Decontaminate Building - Trailer - Single	4431-BLD-001	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4431	Aerodrome Office	834	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Aerodrome Office - Demolish and foundations - Timber Cribbing to Elevate Building	4431-BLD-001	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4431	Aerodrome Office	838	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - AERODROME OFFICE RAW WATER TANK - NORWESCO L: 1613 W: 737 H: 1676	4431-TK-001	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4431	Aerodrome Office	839	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - AERODROME OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	4431-TK-004	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4435	Field Electrical Centre	850	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Aerodrome Field Electrical Centre - Demolish and Decontaminate Building - Special Modular / Prefabricated	4435-BLD-001	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		711	711	711	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities																																																												
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	859	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Service Core - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-001	1,857	m2	0.2	3.4	22.4	33.6	59.4	416	6,244	41,589	62,438	110,270	1	1,857	100%	0%	0%	100%	110,270	0	0	110,270	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		36,757	36,757	36,757	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	862	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Office - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-002	608	m2	0.2	3.4	22.4	33.6	59.4	136	2,044	13,613	20,438	36,094	1	608	100%	0%	0%	100%	36,094	0	0	36,094	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,031	12,031	12,031	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	865	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Laundry - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-003	424	m2	0.2	3.4	22.4	33.6	59.4	95	1,425	9,492	14,250	25,167	1	424	100%	0%	0%	100%	25,167	0	0	25,167	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		8,389	8,389	8,389	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	868	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Laboratory - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-004	312	m2	0.2	3.4	22.4	33.6	59.4	70	1,050	6,994	10,500	18,544	1	312	100%	0%	0%	100%	18,544	0	0	18,544	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		6,181	6,181	6,181	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	899	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AA - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-001	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	902	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AB - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-002	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	905	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AC - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-003	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	908	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AD - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-004	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0- Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	911	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AE - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-005	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	914	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AF - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-006	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	917	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AG - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-007	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	921	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Emergency Response Office - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4513-BLD-001	89	m2	0.2	3.4	22.4	33.6	59.4	20	300	1,998	3,000	5,298	1	89	100%	0%	0%	100%	5,298	0	0	5,298	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,766	1,766	1,766	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	922	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Response Office - Demolish and foundations - Timber Cribbing to Elevate Building	4513-BLD-001	89	m2	0.1	1.2	7.8	11.8	20.8	11	105	699	1,050	1,854	0	27	100%	0%	0%	100%	1,854	0	0	1,854	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		618	618	618	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	924	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Emergency Response Garage - Demolish and Decontaminate Building - Fold-away Building (Steel)	4513-BLD-002	279	m2	0.2	2.4	15.7	23.5	41.6	44	656	4,371	6,563	11,590	1	279	100%	0%	0%	100%	11,590	0	0	11,590	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,863	3,863	3,863	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	925	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Emergency Response Garage - Demolish and foundations - Precast Footing (Perimeter Beam)	4513-BLD-002	279	m2	0.1	2.2	14.5	21.8	38.5	40	607	4,045	6,073	10,725	1	209	100%	0%	0%	100%	10,725	0	0	10,725	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,575	3,575	3,575	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	926	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Emergency Response Garage - Demolish floor finish - Slab on grade C/W Drainage	4513-BLD-002	279	m2	0.1	1.9	12.5	18.8	33.1	35	523	3,482	5,228	9,233	0	0	100%	0%	0%	100%	9,233	0	0	9,233	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,078	3,078	3,078	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	937	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - EMERGENCY RESPONSE OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	4513-TK-004	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	938	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - EMERGENCY RESPONSE OFFICE RAW WATER TANK - NORWESCO L: 1613 W: 737 H: 1676	4513-TK-005	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	939	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MINE EMERGENCY RESPONSE GARAGE DIESEL FUEL TANK - DTE ULC601-07	4513-TK-023	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	942	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Maintenance Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4521-BLD-001	2,416	m2	0.6	2.4	56.0	84.1	142.4	1,354	5,688	135,299	203,125	344,112	1	2,416	100%	0%	0%	100%	344,112	0	0	344,112	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		114,704	114,704	114,704	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	943	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Maintenance Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4521-BLD-001	2,416	m2	0.1	2.2	14.5	21.8	38.5	351	5,263	35,057	52,631	92,950	1	1,812	100%	0%	0%	100%	92,950	0	0	92,950	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		30,983	30,983	30,983	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	944	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Maintenance Building - Demolish floor finish - Slab on grade C/W Drainage	4521-BLD-001	2,416	m2	0.1	1.9	12.5	18.8	33.1	302	4,531	30,178	45,307	80,016	0	0	100%	0%	0%	100%	80,016	0	0	80,016	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		26,672	26,672	26,672	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	945	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Warehouse - Demolish and Decontaminate Building - Fold-away Building (Steel)	4521-BLD-002	892	m2	0.6	2.4	56.0	84.1	142.4	500	2,100	49,957	75,000	127,057	1	892	100%	0%	0%	100%	127,057	0	0	127,057	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		42,352	42,352	42,352	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	946	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Warehouse - Demolish and foundations - Precast Footing (Perimeter Beam)	4521-BLD-002	892	m2	0.1	2.2	14.5	21.8	38.5	130	1,943	12,944	19,433	34,320	1	669	100%	0%	0%	100%	34,320	0	0	34,320	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		11,440	11,440	11,440	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	947	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Warehouse - Demolish floor finish - Slab on grade C/W Drainage	4521-BLD-002	892	m2	0.1	1.9	12.5	18.8	33.1	112	1,673	11,143	16,729	29,544	0	0	100%	0%	0%	100%	29,544	0	0	29,544	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		9,848	9,848	9,848	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	948	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Welding Shop Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4521-BLD-003	390	m2	0.6	2.4	56.0	84.1	142.4	219	919	21,856	32,813	55,587	1	390	100%	0%	0%	100%	55,587	0	0	55,587	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		18,529	18,529	18,529	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	949	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Welding Shop Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4521-BLD-003	390	m2	0.1	2.2	14.5	21.8	38.5	57	850	5,663	8,502	15,015	1	293	100%	0%	0%	100%	15,015	0	0	15,015	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,005	5,005	5,005	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	950	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Welding Shop Building - Demolish floor finish - Slab on grade C/W Drainage	4521-BLD-003	390	m2	0.1	1.9	12.5	18.8	33.1	49	732	4,875	7,319	12,926	0	0	100%	0%	0%	100%	12,926	0	0	12,926	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		4,309	4,309	4,309	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	951	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Workshop Office Building - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4521-BLD-004	268	m2	0.6	3.4	56.0	84.1	143.4	150	900	14,987	22,500	38,387	1	268	100%	0%	0%	100%	38,387	0	0	38,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,796	12,796	12,796	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	952	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Workshop Office Building - Demolish and foundations - Timber Cribbing to Elevate Building	4521-BLD-004	268	m2	0.1	1.2	7.8	11.8	20.8	33	315	2,098	3,150	5,563	0	80	100%	0%	0%	100%	5,563	0	0	5,563	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,854	1,854	1,854	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	954	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Workshop Office Washcar - Demolish and Decontaminate Building - Trailer - Single	4521-BLD-005	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	955	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Workshop Office Washcar - Demolish and foundations - Timber Cribbing to Elevate Building	4521-BLD-005	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	971	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - WELDING SHOP DIESEL FUEL TANK - DTE ULC601-07	4521-TK-005	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	972	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MAINTENANCE BUILDING DIESEL TANK	4521-TK-013	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	973	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - WAREHOUSE BUILDING DIESEL TANK	4521-TK-023	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	974	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - WORKSHOP OFFICE WASHCAR RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	4521-TK-050	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	975	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - WORKSHOP OFFICE WASHCAR SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	4521-TK-053	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	976	In Meters	piping	Piping	Piping	Bulks	Piping		Maintenance Building Utility Piping - Piping Installation - Water, air and lube piping inside building	4521.5-P	405	m	0.3	3.8	25.0	37.5	66.2	101	1,519	10,116	15,188	26,822	0	4	100%	0%	100%	0%	26,822	0	26,822	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		8,941	8,941	8,941	0	0	0	0	0
4000	Mine Site	4400	Non Process Facilities	4430	Aerodrome Facilities	4432	Equipment Building		BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Aerodrome Equipment Building - Demolish and Decontaminate Building - Undefined	4521-BLD-003	1,296	m2	0.6	2.4	56.0	84.1	142.4	726	3,050	72,567	108,945	184,563	1	1,296	100%	0%	0%	100%	184,563	0	0	184,563	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		61,521	61,521	61,521	0	0	0	0	0
4000	Mine Site	4400	Non Process Facilities	4430	Aerodrome Facilities	4432	Equipment Building		BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Aerodrome Equipment Building - Demolish and foundations - Undefined	4521-BLD-003	1,296	m2	0.1	2.2	14.5	21.8	38.5	188	2,823	18,802	28,228	49,853	1	972	100%	0%	0%	100%	49,853	0	0	49,853	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		16,618	16,618	16,618	0	0	0	0	0
4000	Mine Site	4400	Non Process Facilities	4430	Aerodrome Facilities	4432	Equipment Building		BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Aerodrome Equipment Building - Demolish floor finish - Undefined	4521-BLD-003	1,296	m2	0.1	1.9	12.5	18.8	33.1	162	2,430	16,186	24,300	42,916	0	0	100%	0%	0%	100%	42,916	0	0	42,916	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		14,305	14,305	14,305	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment	1015	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Bench grinder	Light Plant		10	Ea	8.1	106.5	809.3	1,065.0	1,980.8	81	1,065	8,093	10,650	19,808	1	5	100%	0%	0%	100%	19,808	0	0	19,808	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		6,603	0	6,603	0	0	0	0	6,603
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment	1015	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Bench grinder	Frost Fighter Heater		10	Ea	8.1	106.5	809.3	1,065.0	1,980.8	81	1,065	8,093	10,650	19,808	1	5	100%	0%	0%	100%	19,808	0	0	19,808	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		6,603	0	6,603	0	0	0	0	6,603
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment		FRF	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Heater	Frost Fighter Heater	MR-FAC-POH-010	52	Ea	8.1	106.5	809.3	1,065.0	1,980.8	421	5,538	42,084	55,380	103,002	1	26	100%	0%	0%	100%	103,002	0	0	103,002	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		34,334	0	34,334	0	0	0	0	34,334
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment		HOB	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Hot Box	Hot Box Heater	MR-FAC-POH-020	4	Ea	8.1	106.5	809.3	1,065.0	1,980.8	32	426	3,237	4,260	7,923	1	2	100%	0%	0%	100%	7,923	0	0	7,923	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		2,641	0	2,641	0	0	0	0	2,641
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1031	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Truck Wash Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4523-BLD-001	1,004	m2	0.6	2.4	56.0	84.1	142.4	563	2,363	56,201	84,375	142,939	1	1,004	100%	0%	0%	100%	142,939	0	0	142,939	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		47,646	47,646	47,646	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1032	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Truck Wash Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4523-BLD-001	1,004	m2	0.1	2.2	14.5	21.8	38.5	146	2,186	14,562	21,862	38,610	1	753	100%	0%	0%	100%	38,610	0	0	38,610	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,870	12,870	12,870	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1031	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Additonal Truck Wash Building		1,500	m2	0.6	2.4	56.0	84.1	142.4	841	3,531	83,990	126,094	213,614	1	1,500	100%	0%	0%	100%	213,614	0	0	213,614	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		71,205	71,205	71,205	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1032	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Additonal Truck Wash Building - Demolish and foundations - Precast Footing (Perimeter Beam)		1,500	m2	0.1	2.2	14.5	21.8	38.5	218	3,267	21,762	32,671	57,701	1	1,125	100%	0%	0%	100%	57,701	0	0	57,701	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		19,234	19,234	19,234	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1038	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - TRUCK WASH BUILDING DIESEL TANK	4523-TK-004	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325		2014	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1038		MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment		Additional Truck Wash Building - Truck Wash System		1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1041	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-001	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1044	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-002	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1047	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #3 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-003	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1050	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #4 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-004	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1053	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #5 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-005	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1056	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #6 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-006	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1059	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-007	67	m2	0.6	3.4	56.0	84.1	143.4	38	225	3,747	5,625	9,597	1	67	100%	0%	0%	100%	9,597	0	0	9,597	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,199	3,199	3,199	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1062	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-008	67	m2	0.6	3.4	56.0	84.1	143.4	38	225	3,747	5,625	9,597	1	67	100%	0%	0%	100%	9,597	0	0	9,597	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,199	3,199	3,199	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1065	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Power Generation Stores - Demolish and Decontaminate Building - ISO Shipping Container	4530-BLD-009	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,422	1,422	1,422	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation		BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Additional Buildings by BIM Site Services slab on grade		180	m2	0.1	1.9	12.5	18.8	33.1	23	338	2,248	3,375	5,961	0	0	100%	0%	0%	100%	5,961	0	0	5,961	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,987	1,987	1,987	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Electrical Office - Demolish and Decontaminate Building - Fold-away Building (Steel)	4530-BLD-BIM-001	20	m2	0.2	3.4	22.4	33.6	59.4	4	67	448	673	1,188	1	20	100%	0%	0%	100%	1,188	0	0	1,188	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		396	396	396	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation		BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Electrical Shop - Demolish and Decontaminate Building - Fold-away Building (Steel)	4530-BLD-BIM-002	20	m2	0.2	2.4	15.7	23.5	41.6	3	47	314	471	831	1	20	100%	0%	0%	100%	831	0	0	831	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		277	277	277	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation		BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Electrical Shop - Demolish and foundations - Precast Footing (Perimeter Beam)	4530-BLD-BIM-002	20	m2	0.1	2.2	14.5	21.8	38.5	3	44	290	436	769	1	15	100%	0%	0%	100%	769	0	0	769	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		256	256	256	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1069	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Waste Management Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4540-BLD-001	446	m2	0.6	2.4	56.0	84.1	142.4	250	1,050	24,978	37,500	63,528	1	446	100%	0%	0%	100%	63,528	0	0	63,528	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		21,176	21,176	21,176	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1070	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Waste Management Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4540-BLD-001	446	m2	0.1	2.2	14.5	21.8	38.5	65	972	6,472	9,716	17,160	1	335	100%	0%	0%	100%	17,160	0	0	17,160	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,720	5,720	5,720	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1071	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Waste Management Building - Demolish floor finish - Slab on grade C/W Drainage	4540-BLD-001	446	m2	0.1	1.9	12.5	18.8	33.1	56	836	5,571	8,364	14,772	0	0	100%	0%	0%	100%	14,772	0	0	14,772	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		4,924	4,924	4,924	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1072	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Waste Incinerators - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4540-VP-001	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,914	4,375	7,464	1	52	100%	0%	0%	100%	7,464	0	0	7,464	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,488	2,488	2,488	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1082	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - MILNE WASTE MANAGEMENT BUILDING DIESEL FUEL TANK - DTE ULC601-07	4540-TK-007	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		2,131	2,131	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1083	VP-	VP1	VENDOR PKG - Incinerator	VP1	Packaged Facilities	Incinerator		WASTE INCINERATOR VENDOR PACKAGE	4540-VP-001	1	Ea	47.0	480.0	4,695.9	4,800.0	9,975.9	47	480	4,696	4,800	9,976	329	329	100%	0%	0%	100%	9,976	0	0	9,976	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,325	3,325	3,325	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Existing Landfill		6,245	m2	0.2	2.0	22.2	22.2	44.4	1,527	12,659	138,352	138,730	289,742	0	0	100%	0%	0%	100%	289,742	0	0	289,742	Type A 2AM-MRY1325	Modified	2014	Direct				100%							0		0	289,742	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Landfill Expansion		4,475	m2	0.2	2.0	22.2	22.2	44.369	1,094	9,071	99,140	99,411	198,550	0	0	100%	0%	0%	100%	198,550	0	0	198,550	Type A 2AM-MRY1325		2015 A	Direct				100%							0		0	198,550	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Landfill Expansion		400	m2	0.2	2.0	22.2	22.2	44.4	98	811	8,862	8,886	17,747	0	0	100%	0%	0%	100%	17,747	0	0	17,747	Type A 2AM-MRY1325	Added	2015 R	Direct				100%							0		0	17,747	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Lined Containment Cell		900	m2	0.0	0.2	4.4	0.7	5.3	40	160	4,004	643	4,807	0	0	100%	0%	0%	100%	4,807	0	0	4,807	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		1,602	1,602	1,602	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-1	754	m2	0.0	0.2	4.4	0.7	5.3	34	134	3,355	539	4,028	0	0	100%	0%	0%	100%	4,028	0	0	4,028	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,343	1,343	1,343	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-2	1,298	m2	0.0	0.2	4.4	0.7	5.3	58	231	5,775	927	6,890	0	0	100%	0%	0%	100%	6,890	0	0	6,890	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		2,297	2,297	2,297	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-3	600	m2	0.0	0.2	4.4	0.7	5.3	27	107	2,669	429	3,185	0	0	100%	0%	0%	100%	3,185	0	0	3,185	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,062	1,062	1,062	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-4	649	m2	0.0	0.2	4.4	0.7	5.3	29	116	2,887	464	3,445	0	0	100%	0%	0%	100%	3,445	0	0	3,445	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,148	1,148	1,148	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-5	347	m2	0.0	0.2	4.4	0.7	5.3	15	62	1,544	248	1,842	0	0	100%	0%	0%	100%	1,842	0	0	1,842	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		614	614	614	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-6	550	m2	0.0	0.2	4.4	0.7	5.3	24	98	2,447	393	2,920	0	0	100%	0%	0%	100%	2,920	0	0	2,920	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		973	973	973	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm - 2016 (new) - 1	MS-HWB-XX	360	m2	0.0	0.2	4.4	0.7	5.3	16	64	1,602	257	1,911	0	0	100%	0%	0%	100%	1,911	0	0	1,911	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		637	637	637	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm - 2016 (new) - 2	MS-HWB-XX	360	m2	0.0	0.2	4.4	0.7	5.3	16	64	1,602	257	1,911	0	0	100%	0%	0%	100%	1,911	0	0	1,911	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		637	637	637	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm - 2016 (new-by generator) - 3	MS-HWB-XX	160	m2	0.0	0.2	4.4	0.7	5.3	7	28	712	114	849	0	0	100%	0%	0%	100%	849	0	0	849	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		283	283	283	0	0	0	0	0
4000	Mine Site	4600	Fuel System																																																												
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4611	Containment Dyke			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Fuel Farm Tank Dike		1,911	m2	0.0	0.2	4.4	0.7	5.3	85	340	8,503	1,366	10,209	0	0	100%	0%	0%	100%	10,209	0	0	10,209	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		5,105	5,105	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4611	Containment Dyke			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Fuel Tank Containment Area		400	m2	0.0	0.2	4.4	0.7	5.3	18	71	1,780	286	2,137	0	0	100%	0%	0%	100%	2,137	0	0	2,137	Type A 2AM-MRY1325		2015	Direct			50%	50%							0		1,068	1,068	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1089	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Diesel Fuel Dispensing Module - Demolish and Decontaminate Building - ISO Shipping Container	4613-FD-013	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		2,133	2,133	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1101	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 8350 DIA H: 9140	4613-TK-009	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1102	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 8350 DIA H: 9140	4613-TK-010	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1103	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 8350 DIA H: 9140	4613-TK-011	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1104	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 8350 DIA H: 9140	4613-TK-012	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System		ENE	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Diesel Module	Diesel Module 1	MR-FUM-FDI-010	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System		FIR	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Jet A1 Pump Module	Jet A1 Pump Module	MR-FUM-FUS-020-PUM01	1	Ea	8.1	106.5	809.3	1,065.0	1,980.8	8	107	809	1,065	1,981	1	1	100%	0%	0%	100%	1,981	0	0	1,981	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		660	0	660	0	0	0	0	660
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System		TK-	MT5-d	Medium Mobile Diesel Tanks (3000 L to 500k L)	MT5-d	Mechanical Equipment	Medium Mobile Diesel Tanks		50,000 L Portable Fuel Dispensing Unit		2	Ea	42.7	564.8	4,268.8	5,647.5	10,481.0	85	1,130	8,538	11,295	20,962	30	60	100%	0%	0%	100%	20,962	0	0	20,962	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		6,987	0	6,987	0	0	0	0	6,987
4000	Mine Site	4700	Site Utilities																																																												
4000	Mine Site	4700	Site Utilities	4710	Raw Water Intake	4712	Raw Water System	1115	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Raw Water Pumphouse - Demolish and Decontaminate Building - Special Modular / Prefabricated	4712-BLD-001	15	m2	0.2	3.4	22.4	33.6	59.4	3	50	333	500	883	1	15	100%	0%	0%	100%	883	0	0	883	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		294	294	294	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4710	Raw Water Intake	4712	Raw Water System	1119	In Meters	piping	Piping	Piping	Bulks	Piping		Raw Water Supply Pipe - Piping Installation - Pumphouse to Water Building	4712.2-P	8,518	m	0.3	3.8	25.0	37.5	66.2	2,130	31,943	212,766	319,425	564,133	0	85	100%	0%	100%	0%	564,133	0	564,133	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		188,044	188,044	188,044	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1121	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Water Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4720-BLD-001	390	m2	0.2	2.4	15.7	23.5	41.6	61	919	6,120	9,188	16,226	1	390	100%	0%	0%	100%	16,226	0	0	16,226	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,409	5,409	5,409	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1122	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Water Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4720-BLD-001	390	m2	0.1	2.2	14.5	21.8	38.5	57	850	5,663	8,502	15,015	1	293	100%	0%	0%	100%	15,015	0	0	15,015	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,005	5,005	5,005	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1143	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - RAW WATER TANK	4720-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1144	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - FIRE WATER TANK	4720-TK-007	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1145	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - POTABLE WATER STORAGE TANK	4720-TK-009	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1146	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - BACKWASH SETTLING TANK	4720-TK-012	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1147	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - MINE WATER BUILDING DIESEL FUEL TANK - DTE ULC601-07	4720-TK-033	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		2,131	2,131	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1148	VP-	VP2	VENDOR PKG - Potable Water	VP2	Packaged Facilities	Potable Water		POTABLE WATER TREATMENT PLANT VENDOR PACKAGE	4720-VP-020	1	Ea	47.0	480.0	4,695.9	4,800.0	9,975.9	47	480	4,696	4,800	9,976	329	329	100%	0%	100%	0%	9,976	0	9,976	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,325	3,325	3,325	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems		TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - POTABLE WATER STORAGE TANK (40 m3)		1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325	Confirmed	2015 A	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems		TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - RAW WATER TANK (60 m3)		1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325	Confirmed	2015 A	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Infill between service and utility pads		20,800	m2	0.01	0.1	1.3	0.4	1.8	264	3,042	26,395	8,248	37,654	0	0	100%	0%	0%	100%	37,654	0	0	37,654	Type A 2AM-MRY1325		2015 A	Direct			33%	33%	33%						0		12,551	12,551	12,551	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1151	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Sewage Chemical Storage Container - Demolish and Decontaminate Building - ISO Shipping Container	4731-BLD-001	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		2,133	2,133	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment		BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Tire Shop at Ore Haul Truck Lineup (seacan construction)		500	m2	0.6	3.4	56.0	84.1	143.4	280	1,681	27,997	42,031	71,709	1	500	100%	0%	0%	100%	71,709	0	0	71,709	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		35,855	35,855	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1154	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Sewage Treatment Plant - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4731-VP-005	178	m2	0.6	3.4	56.0	84.1	143.4	100	600	9,991	15,000	25,591	1	178	100%	0%	0%	100%	25,591	0	0	25,591	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		12,796	12,796	0	0	0	0	0	0

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0- Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1160	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - TREATED EFFLUENT TANK	4731-TK-002	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1161	VP-	VP3	VENDOR PKG - Sewage Treatment Plant	VP3	Packaged Facilities	Sewage Treatment Plant		SEWAGE TREATMENT PLANT VENDOR PACKAGE	4731-VP-005	1	Ea	51.0	540.0	5,095.6	5,400.0	11,035.6	51	540	5,096	5,400	11,036	329	329	100%	0%	100%	0%	11,036	0	11,036	0	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		5,518	5,518	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1163	In Meters	piping	Piping	Piping	Bulks	Piping		Sewage Treatment Piping - Piping Installation - Sewage truck bldg to STP	4731.2-P	247	m	0.3	3.8	25.0	37.5	66.2	62	926	6,170	9,263	16,358	0	2	100%	0%	100%	0%	16,358	0	16,358	0	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,179	8,179	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4732	Sewage Truck Building	1165	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Sewage Truck Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4732-BLD-001	56	m2	0.6	2.4	56.0	84.1	142.4	31	131	3,122	4,688	7,941	1	56	100%	0%	0%	100%	7,941	0	0	7,941	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,971	3,971	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4732	Sewage Truck Building	1166	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Sewage Truck Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4732-BLD-001	56	m2	0.1	2.2	14.5	21.8	38.5	8	121	809	1,215	2,145	1	42	100%	0%	0%	100%	2,145	0	0	2,145	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,073	1,073	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4732	Sewage Truck Building	1172	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MINE SEWAGE TRUCK BUILDING DIESEL FUEL TANK - DTE ULC601-07	4732-TK-003	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4734	Treated Effluent Discharge	1178	In Meters	piping	Piping	Piping	Bulks	Piping		Treated Effluent Piping - Piping Installation - STP to connection with Stockpile Drain Pipe	4734.1-P	2,125	m	0.3	3.8	25.0	37.5	66.2	531	7,969	53,079	79,688	140,735	0	21	100%	0%	100%	0%	140,735	0	140,735	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		46,912	46,912	46,912	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4740	Additional Tanks	4740	Additional Tanks		TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		Additional Medium Size tanks		3	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	93	1,170	9,292	11,700	22,162	2	6	100%	0%	0%	100%	22,162	0	0	22,162	Type B Construction 2BC-MRY1416	Confirmed	2015 A	Direct			50%	50%							0		11,081	11,081	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1180	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accomodation Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-001	59	m2	0.2	3.4	22.4	33.6	59.4	13	200	1,332	2,000	3,532	1	59	100%	0%	0%	100%	3,532	0	0	3,532	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,177	1,177	1,177	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1183	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accomodation Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-002	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1186	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-003	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1189	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-004	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1192	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Fuel Tank Farm E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-005	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,104	1,104	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1195	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Aerodrome Area E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-006	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1198	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Raw Water Supply E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-007	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1201	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Crushing & Screening E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-008	59	m2	0.2	3.4	22.4	33.6	59.4	13	200	1,332	2,000	3,532	1	59	100%	0%	0%	100%	3,532	0	0	3,532	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,177	1,177	1,177	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1204	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 5kV & Ground Wire - Electrical distribution system from power gen to e-house	4750.2-E	11,000	m	0.1	1.5	10.0	15.0	26.5	1,100	16,500	109,905	165,000	291,405	0	110	100%	0%	0%	100%	291,405	0	0	291,405	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		97,135	97,135	97,135	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1205	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 600V - Connections from e-house to facilities	4750.3-E	5,200	m	0.1	1.5	10.0	15.0	26.5	520	7,800	51,955	78,000	137,755	0	52	100%	0%	0%	100%	137,755	0	0	137,755	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		45,918	45,918	45,918	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1205	In Meters	cable	Cable	Cable	Bulks	Cable		Addtitional outdoor lighting for safety (with cables) at Mine Site		3,500	m	0.1	1.5	10.0	15.0	26.5	350	5,250	34,970	52,500	92,720	0	35	100%	0%	0%	100%	92,720	0	0	92,720	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		30,907	30,907	30,907	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	012	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #3 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-012	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	832	1,250	2,207	1	37	100%	0%	0%	100%	2,207	0	0	2,207	Type A 2AM-MRY1325		2015 A	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0

Baffinland

'Mary River Project - Complete Project Security Assessment - Estimate Breakdown Structure'
Issued on November 2, 2017

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
7000	Construction Facilities & Services																																																														
7000	Construction Facilities & Services	7100	Project Wide																																																												
7000	Construction Facilities & Services	7200	Milne Port																																																												
7000	Construction Facilities & Services	7200	Milne Port	7210	Exploration Camp & Facilities	7211	Tent Camp		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		Matrix Camp		5,392	m2	0.2	2.7	17.9	26.9	47.5	967	14,505	96,619	145,054	256,178	1	2,696	100%	0%	0%	100%	256,178	0	0	256,178	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		85,393	85,393	85,393	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1222	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Construction Office - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	7231-BLD-001	268	m2	0.2	3.4	22.4	33.6	59.4	60	900	5,995	9,000	15,895	1	268	100%	0%	0%	100%	15,895	0	0	15,895	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,298	5,298	5,298	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1225	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Aerodrome Office - Demolish and Decontaminate Building - Trailer - Single	7231-BLD-002	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1226	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Aerodrome Office - Demolish and foundations - Timber Cribbing to Elevate Building	7231-BLD-002	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1230	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - AERODROME OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7231-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1231	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - AERODROME OFFICE RAW WATER TANK - NORWESCO L: 1613 W: 737 H: 1676	7231-TK-002	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1239	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Batch Plant Office-Lunchroom-W/C - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-003	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1240	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Batch Plant Office-Lunchroom-W/C - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-003	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1242	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Fuel Systems Office - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-005	45	m2	0.2	3.4	22.4	33.6	59.4	10	150	999	1,500	2,649	1	45	100%	0%	0%	100%	2,649	0	0	2,649	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,325	1,325	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1245	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Fuel Systems Lunchroom - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-006	45	m2	0.2	3.4	22.4	33.6	59.4	10	150	999	1,500	2,649	1	45	100%	0%	0%	100%	2,649	0	0	2,649	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,325	1,325	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1248	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Site Services Lunchroom #1 - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-007	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1249	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Lunchroom #1 - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-007	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1251	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Site Services Lunchroom #2 - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-008	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1252	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Lunchroom #2 - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-008	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1254	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Site Services Washcar #1 - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-009	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1255	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Washcar #1 - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-009	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1257	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Site Services Washcar #2 - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-010	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1258	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Washcar #2 - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-010	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1260	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Smoke Shack - Demolish and Decontaminate Building - ISO Shipping Container	7232-BLD-011	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		711	711	711	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1269	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - BATCH PLANT OFFICE-LUNCHROOM-WC SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7232-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1270	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - BATCH PLANT OFFICE-LUNCHROOM-WC RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1613 W: 737 H: 1676	7232-TK-002	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1271	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - SITE SERVICES WASHCAR #1 SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7232-TK-004	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1272	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #1 RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7232-TK-005	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1273	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #2 SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7232-TK-007	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,074	1,074	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1274	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #2 RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7232-TK-008	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7234	Garages & Workshops		BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Exploration Workshops		250	m2	0.6	2.4	56.0	84.1	142.4	140	589	14,012	21,036	35,637	1	250	100%	0%	0%	100%	35,637	0	0	35,637	Type B Construction 2BC-MRY1416		2014	Direct				100%							0		0	35,637	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7234	Garages & Workshops		BLD	FF3-c	Modular Building Contaminated (480 ft2)	FF3-c	Buildings (Contaminated)	Soft walled Building (tent)		Toromont Maintenance Workshops soft (Contaminated)		878	m2	0.6	2.7	58.2	87.4	148.3	512	2,362	51,138	76,773	130,273	1	439	100%	0%	0%	100%	130,273	0	0	130,273	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		43,424	43,424	43,424	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7234	Garages & Workshops		BLD	FF3-c	Modular Building Contaminated (480 ft2)	FF3-c	Buildings (Contaminated)	Soft walled Building (tent)		Toromont Maintenance Workshops soft (Contaminated)		1,252	m2	0.6	2.7	58.2	87.4	148.3	730	3,369	72,929	109,488	185,785	1	626	100%	0%	0%	100%	185,785	0	0	185,785	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		61,928	61,928	61,928	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1283	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Construction Equipment Building - Demolish and Decontaminate Building - Fabric w/ Sea Can Walls	7235-BLD-001	223	m2	0.1	2.2	14.5	21.8	38.5	32	486	3,236	4,858	8,580	1	167	100%	0%	0%	100%	8,580	0	0	8,580	Type B Construction 2BC-MRY1416	Hold/ Remove	2014	Direct			33%	33%	33%						0		2,860	2,860	2,860	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1284	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Construction Equipment Building - Demolish and foundations - Precast Footing (Perimeter Beam)	7235-BLD-001	223	m2	0.1	2.2	14.5	21.8	38.5	32	486	3,236	4,858	8,580	1	167	100%	0%	0%	100%	8,580	0	0	8,580	Type B Construction 2BC-MRY1416	Hold/ Remove	2014	Direct			33%	33%	33%						0		2,860	2,860	2,860	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1286	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Site Services Heated Warehouse - Demolish and Decontaminate Building - Fold-away Building (Steel)	7235-BLD-002	372	m2	0.2	2.4	15.7	23.5	41.6	58	875	5,828	8,750	15,453	1	372	100%	0%	0%	100%	15,453	0	0	15,453	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,151	5,151	5,151	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1287	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Site Services Heated Warehouse - Demolish and foundations - Precast Footing (Perimeter Beam)	7235-BLD-002	372	m2	0.1	2.2	14.5	21.8	38.5	54	810	5,393	8,097	14,300	1	279	100%	0%	0%	100%	14,300	0	0	14,300	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		4,767	4,767	4,767	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1289	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Site Services Unheated Warehouse - Demolish and Decontaminate Building - Fold-away Building (Steel)	7235-BLD-003	372	m2	0.2	2.4	15.7	23.5	41.6	58	875	5,828	8,750	15,453	1	372	100%	0%	0%	100%	15,453	0	0	15,453	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,151	5,151	5,151	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1290	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Site Services Unheated Warehouse - Demolish and foundations - Precast Footing (Perimeter Beam)	7235-BLD-003	372	m2	0.1	2.2	14.5	21.8	38.5	54	810	5,393	8,097	14,300	1	279	100%	0%	0%	100%	14,300	0	0	14,300	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		4,767	4,767	4,767	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses			25ka	Allowance - For Temporary construction warehouses and offices	25ka	Buildings (Contaminated)	Temporary construction warehouses and offices Allowance		Temporary construction warehouses and offices		1	Lot	94.3	1,415.1	9,434.0	14,150.9	25,000.0	94	1,415	9,434	14,151	25,000	0	0	100%	0%	0%	100%	25,000	0	0	25,000	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		8,333	8,333	8,333	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7250	Construction Facilities	7251	Concrete Facilities	1372	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Concrete Batch Plant Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	7251-BLD-001	669	m2	0.6	2.4	56.0	84.1	142.4	375	1,575	37,468	56,250	95,293	1	669	100%	0%	0%	100%	95,293	0	0	95,293	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		31,764	31,764	31,764	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7250	Construction Facilities	7251	Concrete Facilities	1373	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Concrete Batch Plant Building - Demolish and foundations - Precast Footing (Perimeter Beam)	7251-BLD-001	669	m2	0.6	2.4	56.0	84.1	142.4	375	1,575	37,468	56,250	95,293	1	669	100%	0%	0%	100%	95,293	0	0	95,293	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		31,764	31,764	31,764	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7250	Construction Facilities	7251	Concrete Facilities			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Batch Plant Stockpile		5,180	m2	0.0	0.1	1.3	0.4	1.8	66	758	6,574	2,054	9,386	0	0	100%	0%	0%	100%	9,386	0	0	9,386	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,129	3,129	3,129	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7270	Camp & Site Services	7273	Site Operations			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Existing Lined Storage Area		985	m2	0.0	0.2	4.4	0.7	5.3	44	175	4,384	704	5,263	0	0	100%	0%	0%	100%	5,263	0	0	5,263	Type B Construction 2BC-MRY1416	Check	2014	Direct			33%	33%	33%						0		1,754	1,754	1,754	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7270	Camp & Site Services	7273	Site Operations			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Existing Lined Storage Area		985	m2	0.0	0.2	4.4	0.7	5.3	44	175	4,384	704	5,263	0	0	100%	0%	0%	100%	5,263	0	0	5,263	Type B Construction 2BC-MRY1416	Check	2014	Direct			33%	33%	33%						0		1,754	1,754	1,754	0	0	0	0	0
7000	Construction Facilities & Services	7300	Tote Road																																																														

Baffinland

'Mary River Project - Complete Project Security Assessment - Estimate Breakdown Structure'

Issued on November 2, 2017

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
7000	Construction Facilities & Services	7400	Mine Site																																																												
7000	Construction Facilities & Services	7400	Mine Site	7410	Exploration Camp & Facilities	7411	Tent Camp		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		Exploration Tent Camp Tents		2,400	m2	0.2	2.7	17.9	26.9	47.5	430	6,456	43,003	64,560	114,019	1	1,200	100%	0%	0%	100%	114,019	0	0	114,019	Type A 2AM-MRY1325		2014	Direct				100%							0		0	114,019	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7410	Exploration Camp & Facilities	7411	Tent Camp		BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Exploration Tent Camp Pad		9,432	m2	0.1	1.9	12.5	18.8	33.1	1,179	17,685	117,800	176,853	312,338	0	0	100%	0%	0%	100%	312,338	0	0	312,338	Type A 2AM-MRY1325		2014	Direct				100%							0		0	312,338	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7410	Exploration Camp & Facilities	7411	Tent Camp		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		Exploration Soft-Wall Camp (Weatherhaven)		6,017	m2	0.2	2.7	17.9	26.9	47.5	1,079	16,186	107,814	161,861	285,861	1	3,009	100%	0%	0%	100%	285,861	0	0	285,861	Type A 2AM-MRY1325		2014	Direct				100%							0		0	285,861	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7410	Exploration Camp & Facilities	7411	Tent Camp		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		49-person Soft Wall Camp (previously at Steensby)		950	m2	0.2	2.7	17.9	26.9	47.5	170	2,556	17,022	25,555	45,132	1	475	100%	0%	0%	100%	45,132	0	0	45,132	Type A 2AM-MRY1325	Added	2017	Direct				100%							0		0	45,132	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1401	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Batch Plant Office-Lunchroom-W/C - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-001	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1402	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Batch Plant Office-Lunchroom-W/C - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-001	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1404	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Fuel Systems Lunchroom - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-003	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,987	1,987	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1405	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Fuel Systems Lunchroom - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-003	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		695	695	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1407	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Fuel Systems Washcar - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-004	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		2,559	2,559	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1408	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Fuel Systems Washcar - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-004	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		371	371	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1410	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Site Services Lunchroom #1 - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-005	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1411	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Lunchroom #1 - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-005	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1413	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Site Services Lunchroom #2 - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-006	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1414	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Lunchroom #2 - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-006	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1416	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Site Services Washcar #1 - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-007	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1417	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Washcar #1 - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-007	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1419	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Site Services Washcar #2 - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-008	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1420	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Washcar #2 - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-008	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1422	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Smoke Shack - Demolish and Decontaminate Building - ISO Shipping Container	7432-BLD-009	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		711	711	711	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1433	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - BATCH PLANT OFFICE-LUNCHROOM-WC SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7432-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1434	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - BATCH PLANT OFFICE-LUNCHROOM-WC RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1613 W: 737 H: 1676	7432-TK-002	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1435	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - FUEL SYSTEMS WASHCAR SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7432-TK-004	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1436	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - FUEL SYSTEMS WASHCAR RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7432-TK-005	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,074	1,074	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1437	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - SITE SERVICES WASHCAR #1 SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7432-TK-007	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1438	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #1 RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7432-TK-008	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1439	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - SITE SERVICES WASHCAR #2 SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7432-TK-010	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1440	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #2 RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7432-TK-011	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7434	Garages & Workshops		BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Exploration Workshops		182	m2	0.6	2.4	56.0	84.1	142.4	102	429	10,202	15,316	25,947	1	182	100%	0%	0%	100%	25,947	0	0	25,947	Type A 2AM-MRY1325		2014	Direct				100%							0		0	25,947	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7435	Warehouses			25ka	Allowance - For Temporary construction warehouses and offices	25ka	Buildings (Contaminated)	Temporary construction warehouses and offices Allowance		Temporary construction warehouses and offices		1	Lot	94.3	1,415.1	9,434.0	14,150.9	25,000.0	94	1,415	9,434	14,151	25,000	0	0	100%	0%	0%	100%	25,000	0	0	25,000	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		8,333	8,333	8,333	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7450	Construction Facilities	7451	Concrete Facilities	1513	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Concrete Batch Plant Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	7451-BLD-001	669	m2	0.6	2.4	56.0	84.1	142.4	375	1,575	37,468	56,250	95,293	1	669	100%	0%	0%	100%	95,293	0	0	95,293	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		31,764	31,764	31,764	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7450	Construction Facilities	7451	Concrete Facilities	1514	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Concrete Batch Plant Building - Demolish and foundations - Precast Footing (Perimeter Beam)	7451-BLD-001	669	m2	0.6	2.4	56.0	84.1	142.4	375	1,575	37,468	56,250	95,293	1	669	100%	0%	0%	100%	95,293	0	0	95,293	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		31,764	31,764	31,764	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7470	Camp & Site Services	7473	Site Operations			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Bulk Fuel Storage Facility (Bladder Farm)		5,788	m2	0.0	0.2	4.4	0.7	5.3	257	1,030	25,749	4,136	30,915	0	0	100%	0%	0%	100%	30,915	0	0	30,915	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		15,458	15,458	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7470	Camp & Site Services	7473	Site Operations			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Barreled Fuel Line Containment		5,412	m2	0.0	0.2	4.4	0.7	5.3	241	964	24,076	3,867	28,907	0	0	100%	0%	0%	100%	28,907	0	0	28,907	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		14,453	14,453	0	0	0	0	0	0

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
8000	Other Indirects																																																														
8000	Other Indirects	8100	Other Indirects																																																												
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	EPCM Services				Indirect	Indirect	Indirect	Indirect		Short Term C&M, Closure & Post-Closure Monitoring and reporting													3,766,032	0	0	97%	3%	0%	100%	3,653,053	112,979	0	3,766,032	Type A 2AM-MRY1325	Added	2015 R	Indirect	22%	28%	4%	6%	4%	12%	8%	7%	6%	5%	828,527	1,054,489	142,753	214,429	142,753	448,609	299,629	246,012	209,517	179,249
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													1,535,000	0	0	98%	2%	0%	100%	1,499,632	35,368	0	1,535,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		307,000	307,000	307,000	153,500	153,500	153,500	76,750	76,750
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													151,000	0	0	100%	0%	0%	100%	151,000	0	0	151,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		30,200	30,200	30,200	15,100	15,100	15,100	7,550	7,550
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													33,000	0	0	100%	0%	0%	100%	33,000	0	0	33,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		6,600	6,600	6,600	3,300	3,300	3,300	1,650	1,650
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													483,000	0	0	96%	4%	0%	100%	461,908	21,092	0	483,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		96,600	96,600	96,600	48,300	48,300	48,300	24,150	24,150
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													55,000	0	0	79%	21%	0%	100%	43,507	11,493	0	55,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		11,000	11,000	11,000	5,500	5,500	5,500	2,750	2,750
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													116,000	0	0	100%	0%	0%	100%	116,000	0	0	116,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		23,200	23,200	23,200	11,600	11,600	11,600	5,800	5,800
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													595,000	0	0	98%	2%	0%	100%	581,291	13,709	0	595,000	Type A 2AM-MRY1325		2014	Indirect			40%	30%	20%	10%					0		238,000	178,500	119,000	59,500	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													30,000	0	0	100%	0%	0%	100%	30,000	0	0	30,000	Type A 2AM-MRY1325		2015	Indirect			40%	30%	20%	10%					0		12,000	9,000	6,000	3,000	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													14,000	0	0	100%	0%	0%	100%	14,000	0	0	14,000	Type A 2AM-MRY1325		2015 A	Indirect			40%	30%	20%	10%					0		5,600	4,200	2,800	1,400	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													200,000	0	0	96%	4%	0%	100%	191,266	8,734	0	200,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			40%	30%	20%	10%					0		80,000	60,000	40,000	20,000	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													23,000	0	0	79%	21%	0%	100%	18,194	4,806	0	23,000	Type A 2AM-MRY1325	Added	2016	Indirect			40%	30%	20%	10%					0		9,200	6,900	4,600	2,300	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													46,000	0	0	100%	0%	0%	100%	46,000	0	0	46,000	Type A 2AM-MRY1325	Added	2017	Indirect			40%	30%	20%	10%					0		18,400	13,800	9,200	4,600	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													652,000	0	0	98%	2%	0%	100%	636,977	15,023	0	652,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		130,400	130,400	130,400	65,200	65,200	65,200	32,600	32,600
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													46,000	0	0	100%	0%	0%	100%	46,000	0	0	46,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		9,200	9,200	9,200	4,600	4,600	4,600	2,300	2,300
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													17,000	0	0	100%	0%	0%	100%	17,000	0	0	17,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		3,400	3,400	3,400	1,700	1,700	1,700	850	850
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													244,000	0	0	96%	4%	0%	100%	233,345	10,655	0	244,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		48,800	48,800	48,800	24,400	24,400	24,400	12,200	12,200
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													29,000	0	0	79%	21%	0%	100%	22,940	6,060	0	29,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		5,800	5,800	5,800	2,900	2,900	2,900	1,450	1,450
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													40,000	0	0	100%	0%	0%	100%	40,000	0	0	40,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		8,000	8,000	8,000	4,000	4,000	4,000	2,000	2,000
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													1,643,000	0	0	98%	2%	0%	100%	1,605,144	37,856	0	1,643,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		328,600	328,600	328,600	164,300	164,300	164,300	82,150	82,150
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													125,195	0	0	100%	0%	0%	100%	125,195	0	0	125,195	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		25,039	25,039	25,039	12,519	12,519	12,519	6,260	6,260
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													47,000	0	0	100%	0%	0%	100%	47,000	0	0	47,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		9,400	9,400	9,400	4,700	4,700	4,700	2,350	2,350
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													667,000	0	0	96%	4%	0%	100%	637,873	29,127	0	667,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		133,400	133,400	133,400	66,700	66,700	66,700	33,350	33,350
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													78,000	0	0	79%	21%	0%	100%	61,701	16,299	0	78,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		15,600	15,600	15,600	7,800	7,800	7,800	3,900	3,900
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													108,000	0	0	100%	0%	0%	100%	108,000	0	0	108,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		21,600	21,600	21,600	10,800	10,800	10,800	5,400	5,400
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													1,524,000	0	0	98%	2%	0%	100%	1,488,886	35,114	0	1,524,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		304,800	304,800	304,800	152,400	152,400	152,400	76,200	76,200
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													76,000	0	0	100%	0%	0%	100%	76,000	0	0	76,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		15,200	15,200	15,200	7,600	7,600	7,600	3,800	3,800
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													35,000	0	0	100%	0%	0%	100%	35,000	0	0	35,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		7,000	7,000	7,000	3,500	3,500	3,500	1,750	1,750
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													513,000	0	0	96%	4%	0%	100%	490,598	22,402	0	513,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		102,600	102,600	102,600	51,300	51,300	51,300	25,650	25,650
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													58,000	0	0	79%	21%	0%	100%	45,880	12,120	0	58,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		11,600	11,600	11,600	5,800	5,800	5,800	2,900	2,900
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													117,000	0	0	100%	0%	0%	100%	117,000	0	0	117,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		23,400	23,400	23,400	11,700	11,700	11,700	5,850	5,850
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Off-Site Disposal of Waste & Material				Indirect	Indirect	Indirect	Indirect		Off-Site Disposal of Waste & Material													1,969,000	0	0	100%	0%	0%	100%	1,969,000	0	0	1,969,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		656,333	656,333	656,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													2,889,000	0	0	100%	0%	0%	100%	2,889,000	0	0	2,889,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		963,000	963,000	963,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													30,000	0	0	100%	0%	0%	100%	30,000	0	0	30,000	Type A 2AM-MRY1325		2015	Indirect			33%	33%	33%						0		10,000	10,000	10,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													9,000	0	0	100%	0%	0%	100%	9,000	0	0	9,000	Type A 2AM-MRY1325		2015 A	Indirect			33%	33%	33%						0		3,000	3,000	3,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													209,000	0	0	100%	0%	0%	100%	209,000	0	0	209,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		69,667	69,667	69,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													14,000	0	0	100%	0%	0%	100%	14,000	0	0	14,000	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		4,667	4,667	4,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													28,000	0	0	100%	0%	0%	100%	28,000	0	0	28,000	Type A 2AM-MRY1325	Added	2017	Indirect			33%	33%	33%						0		9,333	9,333	9,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)					Indirect	Indirect			Ammonium Nitrate (explosive material)													2,537,000	0	0	100%	0%	0%	100%	2,537,000	0	0	2,537,000	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		845,667	845,667	845,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment				Indirect	Indirect	Indirect	Indirect		Contaminated Soil Treatment													234,000	0	0	100%	0%	0%	100%	234,000	0	0	234,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		78,000	78,000	78,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													63,000	0	0	100%	0%	0%	100%	63,000	0	0	63,000	Type A 2AM-MRY1325	Added	2017	Indirect			33%	33%	33%						0		21,000	21,000	21,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													5,000	0	0	100%	0%	0%	100%	5,000	0	0	5,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		1,667	1,667	1,667	0	0	0	0	0
9000	Owner Accounts																																																														
9000	Owner Accounts	9100	Owner Accounts																																																													
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													2,519,000	0	0	98%	2%	0%	100%	2,460,960	58,040	0	2,519,000	Type A 2AM-MRY1325		2014	Indirect			100%								0		2,519,000	0	0	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													188,000	0	0	100%	0%	0%	100%	188,000	0	0	188,000	Type A 2AM-MRY1325	Added	2017	Indirect			100%								0		188,000	0	0	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													232,000	0	0	100%	0%	0%	100%	232,000	0	0	232,000	Type A 2AM-MRY1325		2015	Indirect			100%								0		232,000	0	0	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													820,000	0	0	96%	4%	0%	100%	784,192	35,808	0	820,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			100%								0		820,000	0	0	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													94,000	0	0	79%	21%	0%	100%	74,357	19,643	0	94,000	Type A 2AM-MRY1325	Added	2016	Indirect			100%								0		94,000	0	0	0	0	0	0	0

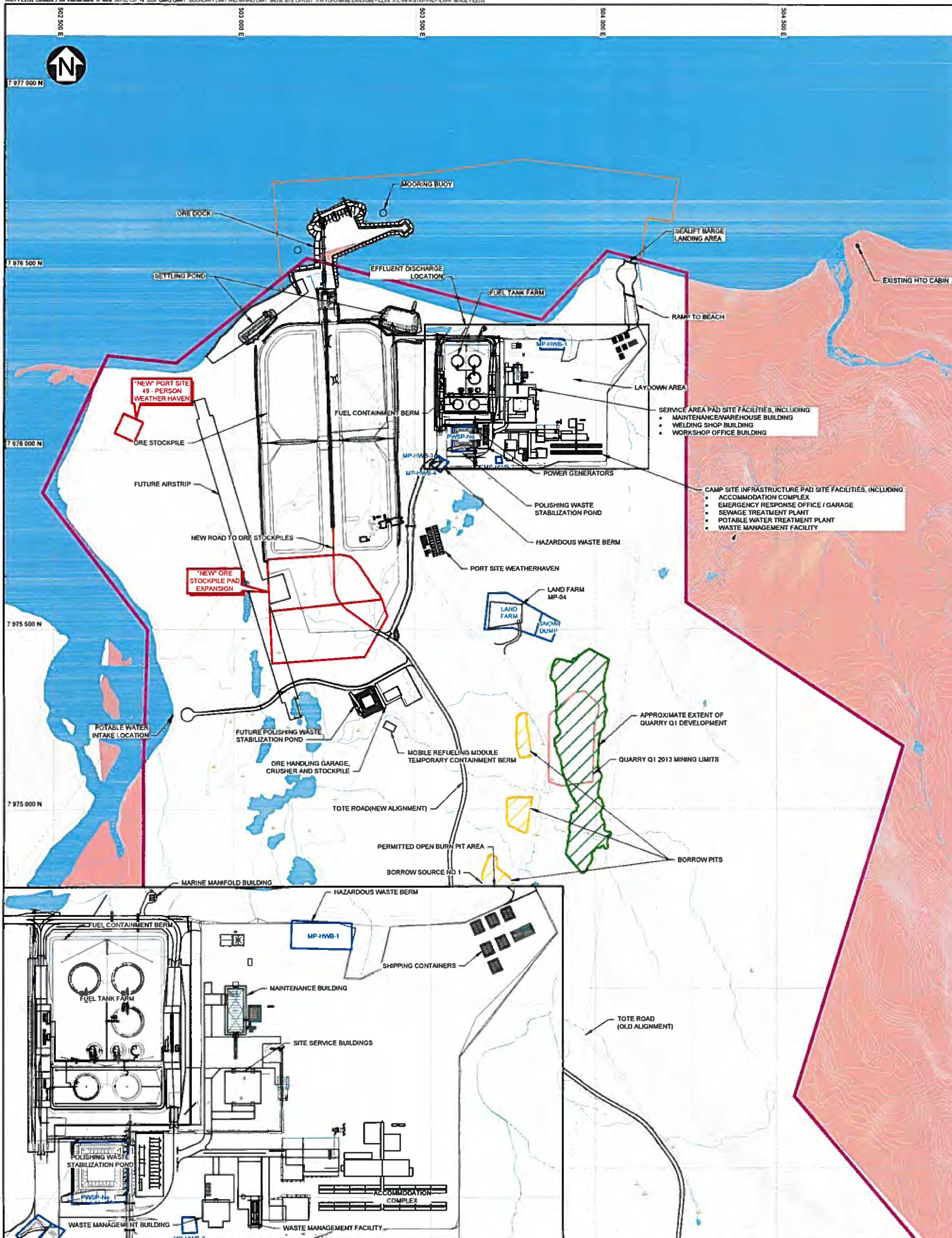
Appendix B

Updated Site Layouts

2017 Work Plan - Mine Site Layout

2017 Work Plan – Milne Port Layout

SAVED: I:\1\02\00181\40\A\Acad\FIGS\B04_r0, 11/2/2016 4:31:14 PM , ASIMPSON PRINTED: 11/2/2016 4:41:40 PM, Layout1, ASIMPSON



LEGEND:

- WATER
- BORROW AREAS (2013 UNDER Q10C3001)
- QUARRY AREA (EXISTING UNDER Q13C301)
- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- WASTE STORAGE AREA
- RIVER/STREAM/DRAINAGE
- ROAD
- QIA SURFACE COMMERCIAL LEASE IMPACT BOUNDARY
- "NEW" FEATURE

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PLAN/SECTION BASED ON INFORMATION PROVIDED BY HATCH, DATED (JAN 31,2014).
4. CONTOUR INTERVAL IS 2.5 METRES
5. ALL SAMPLE ID'S SHOWN IN BRACKETS REPRESENT THE TYPE B WATER LICENCE(S) MONITORING POINTS. ALL OTHERS ARE MONITORING POINTS AS PER THE TYPE A WATER LICENCE (2AM-MRY1325)

SCALE A: 100 50 0 100 200 300 400 500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	02NOV'16	ISSUED WITH TRANSMITTAL	AG	AS	RAC

BAFFINLAND IRON MINES CORPORATION

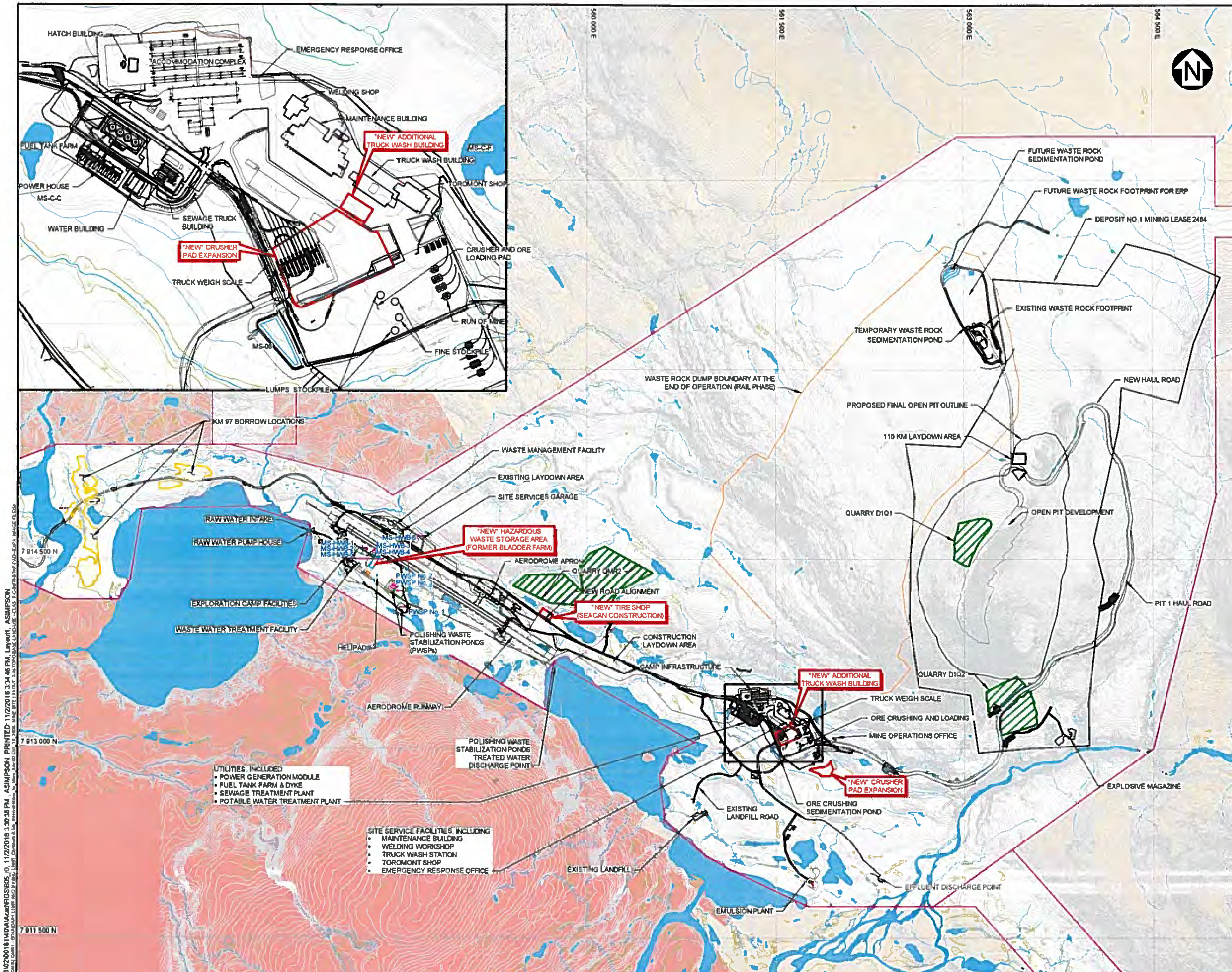
MARY RIVER PROJECT

2017 WORK PLAN
MILNE PORT LAYOUT

Knight Piésold CONSULTING

P/A NO	REF NO
NB102-181/40	NB16-00637

FIGURE 1 — REV 0



LEGEND:

- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS
- WATER
- BORROW AREAS (2013 UNDER Q10C3001)
- QUARRY AREA (EXISTING UNDER Q13C301)
- WASTE STORAGE AREA
- RIVER/STREAM/DRAINAGE
- ROAD
- QIA SURFACE COMMERCIAL LEASE BOUNDARY
- "NEW" FEATURE

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PLAN BASED ON INFORMATION PROVIDED BY HATCH, DATED JAN 13, 2015).
4. CONTOUR INTERVAL IS 2.5 METRES.
5. ALL SAMPLE ID'S SHOWN IN BRACKETS REPRESENT THE TYPE B WATER LICENCE(S) MONITORING POINTS. ALL OTHERS ARE MONITORING POINTS AS PER THE TYPE A WATER LICENCE (2AM-MRY1325).

SCALE A 300 150 0 500 1000 1500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	02NOV'16	ISSUED WITH TRANSMITTAL	AG	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

2017 WORK PLAN
MINE SITE LAYOUT

Knight Piésold CONSULTING

P/A NO. NB102-181/40 | REF NO. NB16-00637

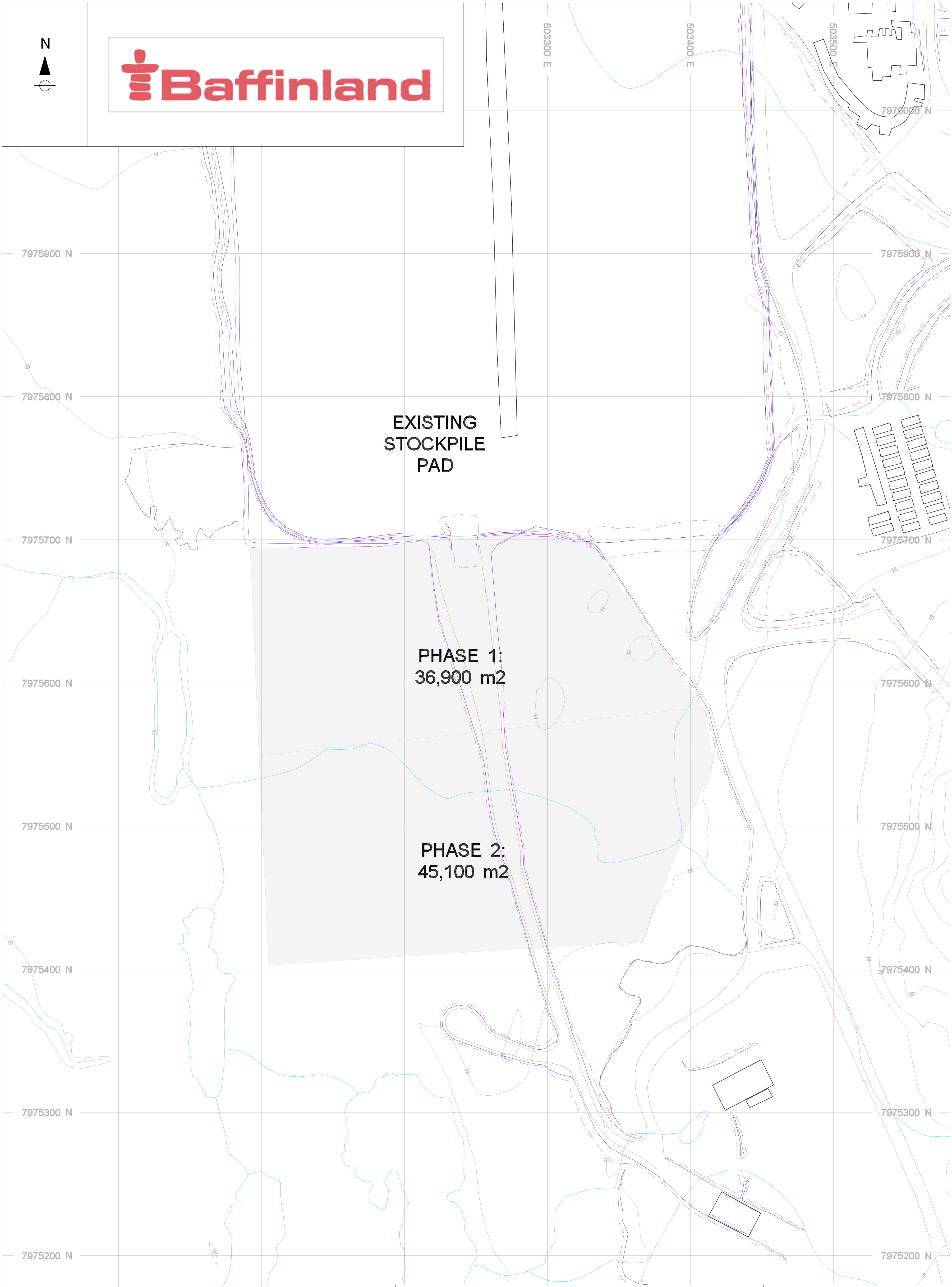
FIGURE 2 | REV 0

Appendix C

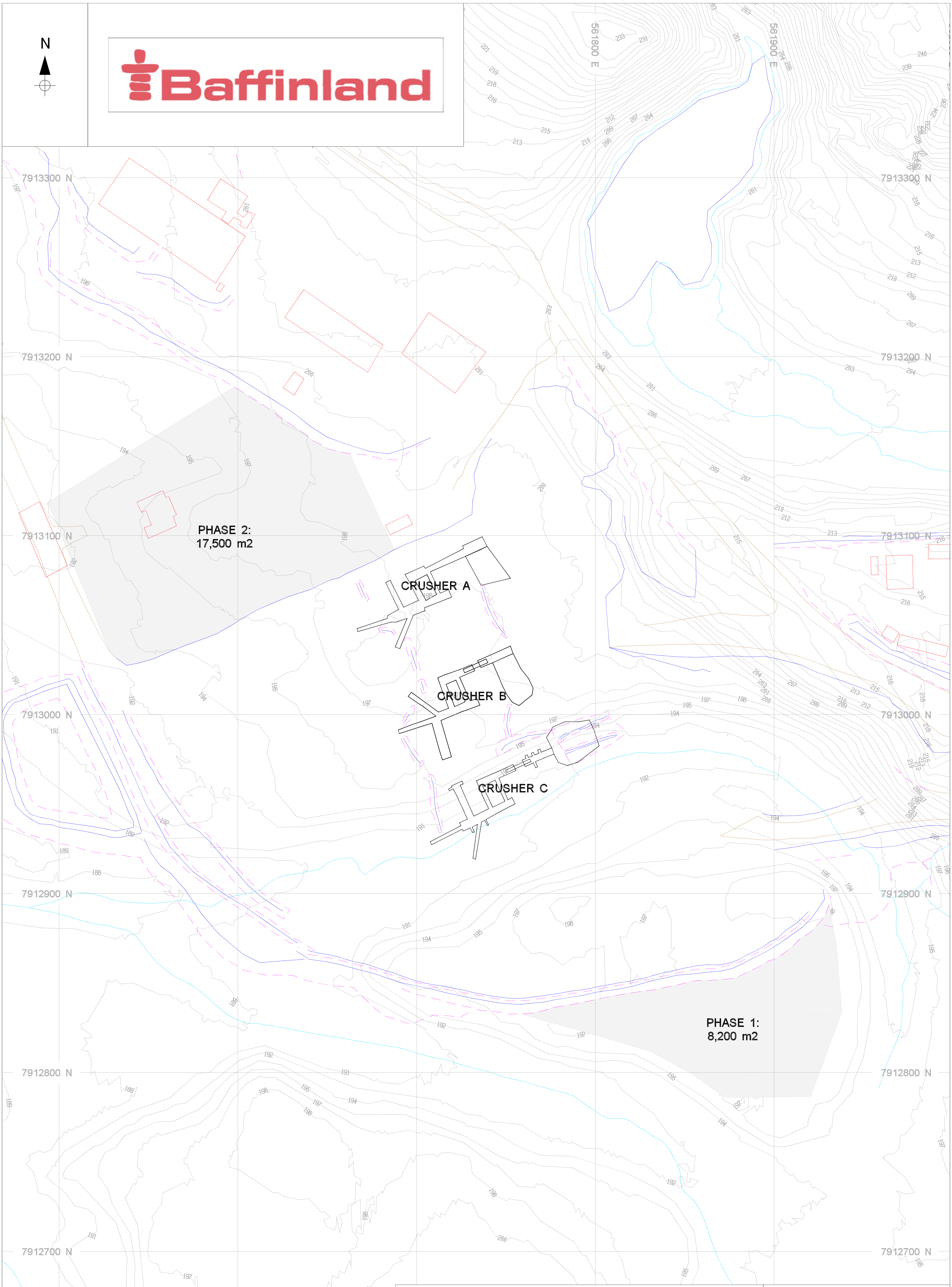
Supporting Documentation

C.1 Milne Port Ore Stockpile Pad extension sketch

C.2 Mine Site Crusher Pad extension sketch



TITLE:	PSC STOCKPILE PAD EXPANSION
LOCATION:	MILNE PORT SITE
DATE:	12 / 10 / 2016
DRAFTED BY:	CDT
PHASE 1 AREA:	36,900 m2
PHASE 2 AREA:	45,100 m2
TOTAL AREA:	82,000 m2



TITLE:	MR STOCKPILE PAD EXPANSION
LOCATION:	MARY RIVER
DATE:	12 / 10 / 2016
DRAFTED BY:	CDT
PHASE 1 AREA:	8,200 m2
PHASE 2 AREA:	17,500 m2
TOTAL AREA:	25,700 m2

Baffinland

Baffinland Iron Mines Corporation

Project Memo

2017 Marginal Closure and Reclamation Security Estimate – Revisions to Reflect Interested Parties Feedback

Date: **November 24, 2016**

Subject: **Revisions to reflect stakeholder feedback on 2017 Marginal Closure and Reclamation Financial Security Estimate**

1. Purpose

The purpose of this memo is to provide a summary of revisions identified to be required to the 2017 Marginal Closure and Reclamation Financial Security Estimate based on feedback received from interested parties and modifications made to better reflect planned 2017 work based on updated information.

The marginal increase proposed in this report is in addition to the marginal increase already proposed in the 2017 Marginal Closure and Reclamation Financial Security Estimate that was developed to consider the 2017 Work Plan dated November 2, 2016 and submitted to the Nunavut Water Board (NWB), the Qikiqtani Inuit Association (QIA), Indigenous and Northern Affairs Canada (INAC) and other stakeholders on November 4, 2016.

2. Modifications Identified

Revisions identified to the 2017 Marginal Closure and Reclamation Financial Security Estimate, based on feedback received from interested parties and modifications made to more accurately reflect planned 2017 work, are:

a) Mobile and mechanical equipment captured in the comprehensive global estimate, including the 2017 Marginal Closure and Reclamation Financial Security Estimate, were re-categorized (e.g. light equipment, medium equipment, and heavy equipment) to better align with category thresholds discussed with the QIA in order to reduce inconsistencies in the QIA and Baffinland security estimates. Category thresholds that were applied generally follow thresholds indicated in Table 1. This issue was addressed based on feedback received from the QIA.

Table 1: Mobile and Mechanical Equipment Classifications

Equipment Classification	Equipment Example
Light Mechanical Equipment	Pumps, fuel dispenser, laboratory equipment, and sample bins
Medium Mechanical Equipment	Aerodrome equipment, generators, shop / maintenance equipment, screens, and chutes.
Heavy Mechanical Equipment	Crusher, feeder, power plant generators, large screens, conveyors, and stackers
Light Mobile Equipment	Forklifts, picks up, vehicles around five (5) tonnes and under, scissor lift, man lifts, and small bin trucks. NOTE: Weight thresholds not always determining factor. Examples of Light Mobile Equipment includes: Skid Steer P10000, and Ford F-350 Pick-Up Truck.
Medium Mobile Equipment	Vehicles around 10 tonnes, trailers, buses, tow trucks, large garbage bins and water trucks. NOTE: Weight thresholds not always determining factor. Examples of Medium Mobile Equipment include: D6 Dozer, Kenworth T800 Fuel/Lube Truck, CAT P20000, Passenger Buses, Secondary Drills, Rock Drills, D6 Wheel Dozer, and Dump Trailers.
Heavy Mobile Equipment	Vehicles over 10 tonnes, boom trucks, large front end loaders, dump trucks, graders and cranes. NOTE: Weight thresholds not always determining factor. Examples of Heavy Mobile Equipment include: D9 Dozer, CAT 740 EFLT Fuel/Lube Truck, CAT 824H Wheel Dozer, and Production Drills.

b) The 49-person camp previously included in the original 2017 Marginal Closure and Reclamation Financial Security Estimate submission was classified as a soft wall modular building (non-contaminated) for the purpose of the submission. Based on updated information, this camp is expected to be a hard wall trailer camp. Therefore the unit rate was modified to apply the 'Modular Building (non-contaminated)' rate instead of the previous 'Soft Wall (non-contaminated)' unit rate. Estimated camp size has not changed. This issue was addressed based on feedback received from INAC.

c) An additional Truck Wash Building is proposed to be constructed in 2017 at the Mine Site. As part of this development, a commercial grade haul truck washing station will be installed within the building. This commercial grade haul truck washing station was accounted for in the 2017 Marginal Closure and Reclamation Financial Security Estimate submission as a piece of 'Medium Mechanical Equipment'. Based on feedback received from the QIA, the unit rate was modified to apply the 'Large Mechanical Equipment' instead.

3. Updated Marginal Reclamation and Closure Security Cost Summary

Table 2 presents the total closure and reclamation security posted to-date and proposed adjustments to be posted as a result of the modifications described in Section 2.

The totals presented are inclusive of all closure and reclamation costs estimated to be required for a 3rd Party Contractor to perform the work in a 'worst-case' scenario for all disturbed areas, project components and project activities existing on the Mary River Project site upon conclusion of the 2017 Work Plan including legacy exploration phase liabilities.

Costs estimated are in accordance with principles, methodology, and closure objectives defined within the Mary River Project Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012).

Table 2: *Revised* Mary River Project 'Global' Closure and Reclamation Security Summary[1]

	A	B	C	D	E	F	G	H	I	J	K
	Authorization	**Liability**	**Original Global Estimate from 2016/17 ASR ($)**	***Revised* Global Estimate from 2016/17 ASR ($)**	**Difference of Original vs. *Revised* from 2016/17 ASR ($)**	**Original 2017/18 ASR Marginal Estimate ($)**	***Revised* 2017/18 ASR Marginal Estimate ($)**	**Difference of Original vs. *Revised* 2017/18 ASR Marginal Estimate ($)**	***Revised* Total 'Global' Estimated Security for 2017/18 ($)**	**Total Posted ($)**	**Adjustment to be Posted ($)**
					D-C			**G-F**	**D+G**		**I-J**
1	Type A 2AM-MRY1325	IOL[2]	45,055,000	46,053,000	998,000	1,880,000	2,019,000	139,000	48,072,000	48,846,000	(774,000)
2		Crown	1,210,000	1,199,000	(11,000)	-	-		1,199,000	1,210,000	(11,000)
3		Water	1,342,000	1,342,000	-	-	-		1,342,000	-	-
4		Land	44,923,000	45,910,000	987,000	1,880,000	2,019,000	139,000	47,929,000	-	-
5	*Subtotal Type A*		*46,265,000*	*47,252,000*	*987,000*	*1,880,000*	*2,019,000*	*139,000*	*49,271,000*	*50,056,000*	*(785,000)*
6	Type B Construction 2BC-MRY1416	IOL[2]	-	-	-	-	-	-	-	-	-
7		Crown	-	-	-	-	-	-	-	147,000	(147,000)
8		Water	-	-	-	-	-	-	-	-	-
9		Land	-	-	-	-	-	-	-	-	-
10	*Subtotal Type B Construction*		-		-	-			-	-	*(147,000)*
11	Type B Exploration 2BE-MRY1421 [3]	IOL	165,000	165,000	-	-	-	-	165,000	-	165,000
12		Crown	1,082,000	1,082,000	-	-	-	-	1,082,000	1,250,000	(168,000)
13		Water	18,000	18,000	-	-	-	-	18,000	-	-
14		Land	1,229,000	1,229,000	-	-	-	-	1,229,000	-	-
15	*Subtotal Type B Exploration*		*1,247,000*	*1,247,000*	-	-			*1,247,000*	*1,250,000*	*(3,000)*
16	DFO Security Associated with Ore Dock	IOL[2]	-	-	-	-	-	-	-	-	-
17		Crown	563,000	563,000	-	-	-	-	563,000	563,000	-
18		Water	563,000	563,000	-	-	-	-	563,000	563,000	-
19		Land	-	-	-	-	-	-	-	-	-
20	*Subtotal DFO*		*563,000*	*563,000*	-	-			*563,000*	*563,000*	-
21	AANDC Land Lease 47H/16-1-2 [4,5]	IOL[2]	-	-	-	-	-	-	-	-	-
22		Crown	4,975,000	4,975,000	-	-	-	-	4,975,000	4,975,000	-
23		Water	-	-	-	-	-	-	-	-	-
24		Land	4,975,000	4,975,000	-	-	-	-	4,975,000	4,975,000	-
25	*Subtotal AANDC Land Lease*		*4,975,000*	*4,975,000*	-	-	-	-	*4,975,000*	*4,975,000*	-
27	**GRAND TOTAL**		**53,050,000**	**54,037,000**	**987,000**	**1,880,000**	**2,019,000**	**139,000**	**1,880,000**	**58,721,000**	**(935,000)**

NOTES:
1) Totals rounded to nearest '000 in CAD
2) Security relating to IOL held by Qikiqtani Inuit Association (QIA) under Commercial Lease No. Q13C301
3) As per Mary River Exploration Project Closure and Reclamation Plan (BAF-PH1-830-P16-0038, Rev 1)
4) Posting process for security relating to AANDC Land Lease 47H/16-1-2 phased into a 2-step approach. Phase 1 to be posted November 2016.
5) As per Closure and Reclamation Strategy and Financial Security Estimate for Nunavut Lease #47H/16-1-2 (H349001-2000-07-126-0001, Rev.0)

4. Supporting Documents

In addition to information presented within this document, please refer to Attachment A for Updated 2017/18 ASR Estimate Breakdown Structure (EBS).

Attachment A:

Updated 2017/18 ASR Estimate Breakdown Structure

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			CON	Consumables	CON		Consumables		Consumables		550	Bed Space	0.0	700.8	0.0	0.0	700.8	0	385,441	0	0	385,441	0	0	100%	0%	0%	100%	385,441	0	0	385,441	Type A 2AM-MRY1325	Added	2015 R	Direct					100%						0		0	0	385,441	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			CON	Consumables	CON		Consumables		Consumables - addition of 49 person camp		49	Bed Space	0.0	700.8	0.0	0.0	700.8	0	34,339	0	0	34,339	0	0	100%	0%	0%	100%	34,339	0	0	34,339	Type A 2AM-MRY1325	Added	2017	Direct					100%						0		0	0	34,339	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2014		11,768	m2	0.2	2.0	22.2	22.2	44.4	2,878	23,855	260,707	261,420	522,127	0	0	100%	0%	0%	100%	522,127	0	0	522,127	Type A 2AM-MRY1325	Modified	2014	Direct					100%						0		0	0	522,127	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015		378	m2	0.2	2.0	22.2	22.2	44.4	92	766	8,374	8,397	16,771	0	0	100%	0%	0%	100%	16,771	0	0	16,771	Type A 2AM-MRY1325	Modified	2015	Direct					100%						0		0	0	16,771	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015 A		8	m2	0.2	2.0	22.2	22.2	44.4	2	16	178	178	356	0	0	100%	0%	0%	100%	356	0	0	356	Type A 2AM-MRY1325	Modified	2015 A	Direct					100%						0		0	0	356	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015 R		4,661	m2	0.2	2.0	22.2	22.2	44.4	1,140	9,448	103,258	103,541	206,799	0	0	100%	0%	0%	100%	206,799	0	0	206,799	Type A 2AM-MRY1325	Added	2015 R	Direct					100%						0		0	0	206,799	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2016		656	m2	0.2	2.0	22.2	22.2	44.4	161	1,330	14,540	14,580	29,121	0	0	100%	0%	0%	100%	29,121	0	0	29,121	Type A 2AM-MRY1325	Added	2016	Direct					100%						0		0	0	29,121	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2017		1,192	ea	0.2	2.0	22.2	22.2	44.4	292	2,417	26,411	26,484	52,895	0	0	100%	0%	0%	100%	52,895	0	0	52,895	Type A 2AM-MRY1325	Added	2017	Direct					100%						0		0	0	52,895	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - Shiploader		5,049	m2	0.2	2.0	22.2	22.2	44.4	1,235	10,235	111,856	112,162	224,018	0	0	0%	100%	0%	100%	0	224,018	0	224,018	Type A 2AM-MRY1325	Added	2015 R	Direct					100%						0		0	0	224,018	0	0	0	0	0
2000	Milne Port	2100	General	2110	Communication and IT Infrastructure	2110	Communication and IT Infrastructure	001	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed - Demolish Building ISO Shipping Container	2110-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Milne Laydown Area		37,375	m2	0.0	0.1	1.3	0.4	1.8	474	5,466	47,428	14,821	67,715	0	0	100%	0%	0%	100%	67,715	0	0	67,715	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		22,572	22,572	22,572	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Disturbed Area @ Milne Port (adjacent to Steel Tank Farm)		45,000	m2	0.0	0.1	1.3	0.4	1.8	571	6,581	57,104	17,845	81,530	0	0	100%	0%	0%	100%	81,530	0	0	81,530	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		27,177	27,177	27,177	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2134				A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Camp Pad @ Milne Port		66,536	m2	0.0	0.1	1.3	0.4	1.8	844	9,731	84,433	26,385	120,549	0	0	100%	0%	0%	100%	120,549	0	0	120,549	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		40,183	40,183	40,183	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2136	Milne Port			A3	Grade & Re-Contour	A9	Site Works	Grade and Re-Contour Building Footprints		Grade and Re-Contour Building Footprints		14,306	m2	0.0	0.1	1.3	0.4	1.8	182	2,092	18,154	5,673	25,919	0	0	100%	0%	0%	100%	25,919	0	0	25,919	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		8,640	8,640	8,640	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Site Roads		12,149	m2	0.0	0.1	1.3	0.4	1.8	154	1,777	15,416	4,817	22,010	0	0	100%	0%	0%	100%	22,010	0	0	22,010	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		7,337	7,337	7,337	0	0	0	0	0
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Mobile Light Plant, Large		5	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	65	600	6,494	6,000	13,094	96	480	100%	0%	0%	100%	13,094	0	0	13,094	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		4,365	0	4,365	0	0	0	0	4,365
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	CAT 992 Loader		4	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	52	480	5,195	4,800	10,475	96	384	100%	0%	0%	100%	10,475	0	0	10,475	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		3,492	0	3,492	0	0	0	0	3,492
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Pick-Up Truck		7	Ea	6.7	25.0	666.1	250.0	941.1	47	175	4,663	1,750	6,588	4	28	100%	0%	0%	100%	6,588	0	0	6,588	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		2,196	0	2,196	0	0	0	0	2,196
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Ford F350 Pickup		6	Ea	6.7	25.0	666.1	250.0	941.1	40	150	3,997	1,500	5,647	4	24	100%	0%	0%	100%	5,647	0	0	5,647	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		1,882	0	1,882	0	0	0	0	1,882
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	Pick-Up Truck		6	Ea	6.7	25.0	666.1	250.0	941.1	40	150	3,997	1,500	5,647	4	24	100%	0%	0%	100%	5,647	0	0	5,647	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,882	0	1,882	0	0	0	0	1,882
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Jump Conveyor		2	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	26	240	2,598	2,400	5,238	96	192	100%	0%	0%	100%	5,238	0	0	5,238	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		1,746	0	1,746	0	0	0	0	1,746
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Stockpile Reclaim Loader, 988		2	Ea	10.0	45.0	999.1	450.0	1,494.1	20	90	1,998	900	2,988	24	48	100%	0%	0%	100%	2,988	0	0	2,988	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		996	0	996	0	0	0	0	996
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		KENWORTH SERVICE TRUCK TOROMONT ML	HTP021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FREIGHTLINER VAC TRUCK	HTP026	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		950H SNOW REMOVAL LOADER	LDR016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		950H SNOW REMOVAL LOADER	LDR017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		INTERNATIONAL 4400 FUEL TRUCK	FLT012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		KALMAR CONTAINER HANDLER	CNH002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		GROVE RT890E CRANE	CRN001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MASABA PORTABLE CONVEYOR	CRURC2	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		OSHKOSH FIRE TRUCK 1998 -T13000 MILNE	EMG001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		345DL EXCAVATOR CATERPILLAR	EXC004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		320BL EXCAVATOR CATERPILLAR	EXC007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2008 GEHL LIFT TRUCK	FKT008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Grove 60 Ton Crane		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	CAT 988 Loader		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	CAT 345 Excavator		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	John Deere 850 Excavator		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Stockpile Mobile Feeder		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Stockpile Mobile Stacker		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Reclaim Mobile Feeder		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Container Handler		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Gantry Crane		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	FIRE TRUCK		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRI-DRIVE V.I.N. # 5KJRASD18CPBF7663		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK VIN # 5KJRAS013BPAZ8119		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK VIN # 5KJRASD1XBPAZ8117		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK NO: OHT033		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK NO: OHT028		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK OTH027		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK VIN # 5KJRASD14BPAZ8114		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		40' FLATRACK TOLU 897574-0, STC JET FUEL A1 FS II DRUMS 205 L		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK VIN# 5KJRASD16BPA28115		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		M320F WHEELED EXCAVATOR		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 FREIGHTLINER SERVICE TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2004 PETERBILT TANKER TRUCK VIN# 2NPNHD8X24M822016		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINING TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINING TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINING TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		60/30 CENTER CAR BODY W BELLY PLATE		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G BODY		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD18GPHD7176		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD18GPHD7175		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		4400 GAL STAINLESS STEEL WATER TANK		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		SEWAGE TANK SERAIL # ST111-0716		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		WATER TANK SERIAL # WT110-0070		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		TK-	MT1-d	Light Diesel (Day tanks 10,000L to	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK, DOUBLE WALLED 2494 LITER		1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,231	0	1,231	0	0	0	0	1,231
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Ford F550 Mechanics Truck		2	Ea	6.7	25.0	666.1	250.0	941.1	13	50	1,332	500	1,882	4	8	100%	0%	0%	100%	1,882	0	0	1,882	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		627	0	627	0	0	0	0	627
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR SNOW PLOW	HTP017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		GMC C8500 FOUNTAIN TIRE	HTP020	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLOAT TRAILER 20 FT - PINTLE HOOK	LBT004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		48 PASSENGER BUS	BUS006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		24 PASSENGER BUS	BUS007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT WATER TRUCK ML 2013	HTP001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		WATER TRUCK	HTP002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		KENWORTH WATER/METHANOL TRUCK	HTP003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		KENWORTH T800 W/ KNUCKLE BOOM 2004	HTP008	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT 367 2014	HTP012	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT 379 2014	HTP023	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT ROLL OFF TRUCK	HTP027	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR PLOW TRUCK	HTP028	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRACTOR	HTP031	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT	JLG001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT Z45/25	JLG003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT Z60/34	JLG006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT 450 AJ SERIES	JLG009	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ROLLER CP563E	RLR001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TL1255	TLH001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER GEHL	TLH006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		CAT TELEHANDLER TL1055C	TLH007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		MINI-CRAWLER CRANE URW-295 (diesel)	CRN005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Freightliner School Bus		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Kenworth Fuel Lube Truck		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	CAT 930 Loader		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Generator 3412-725 KW (Seacan)		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Lunch Rooms		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Man Lift		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Zoom Boom		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Boom Truck		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Passenger Bus		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Integrated Tool Carrier, 938		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	WRECKER TRUCK		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	FREIGHT HAUL TRACTOR ,		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	MAINTENANCE FUEL/LUBE TRUCK ,		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FORD F-350 SILVER PICK-UP , VIN # 1FTWW3BROAEB22478		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		HYDRAULIC PRESS		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FORD F-550 WHITE SERVICE TRUCK XLT FEC061335A		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FORD F-550 WHITE SERVICE TRUCK XLT FEC061336A		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TRACTOR FRTL CABOVER UNIT 512202		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TRACTOR FRTL CABOVER UNIT 512402		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2008 KENWORTH MECHANICAL TRUCK VIN# 2NKMHN7XX8M212914		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		MOBILE OFFICE ON WHEELS SERIAL # 240073498		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLATBED 3 AXLES 533C001		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLATBED 3 AXLES 133W003		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLATBED 3 AXLES UNIT 833X004		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		STEP DECK 3 AXLES UNIT 5334652		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT031	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		JOHN DEREE LIGHT TOWER	ALT032	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 AMBULANCE 2014	EMG008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FOUNTAIN TIRE ATLAS COPCO COMPRESSOR	FCM001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT CATERPILLAR PD7000	FKT002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT CATERPILLAR 2ET4000	FKT003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT MITSUBISHI FB20PNT	FKT004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT CATERPILLAR DP40K-D	FKT007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT VALLEE	FKT009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLAMELESS SPARKLESS HEATER	FSH001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLAMELESS SPARKLESS HEATER	FSH002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		HOTSY MOUNTED ON TRAILER	HTY001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP022	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP023	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2008	LTP032	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2013	LTP035	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2013	LTP036	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2008	LTP037	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP039	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP041	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP042	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP048	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP049	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP050	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP051	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'

Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP052	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP053	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP054	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP055	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 CREW CAB 4X4 - 2011	LTP061	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 CREW CAB 4X4	LTP062	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 CREW CAB 4X4 2012	LTP064	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 CREW CAB 4X4 2012	LTP065	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 CREW CAB 4X4 2008	LTP066	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 DECK TRUCK	MTP003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013	MTP006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SERVICE TRUCK FOUNTAIN TIRE 2015	MTP017	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP	PWP005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP	PWP006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 289C ALL TERRAIN	SKD006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 246 ALL TERRAIN	SKD007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		CAT SKID STEER 2622C2	SKD011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 01	SKJ001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 02	SKJ002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 04	SKJ004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 05	SKJ005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 06	SKJ006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKYJACK/MANLIFT	SKJ007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKYJACK/SCISSOR LIFT	SKJ008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKYJACK/MANLIFT	SKJ009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		MANLIFT - CROWN WAVE	SKJ011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TUNDRA SKI-DOO 2007	SNM001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TUNDRA SKI-DOO 2008	SNM002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE KUBOTA RTV900	SXS002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER TANDEM UTILITY FLAT DECK	TRL003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER TANDEM UTILITY FLAT DECK	TRL004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER TANDEM UTILITY FLAT DECK	TRL005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER TANDEM UTILITY FLAT DECK	TRL006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER MILLER AIR PAK	WLD009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SNOW BLOWER VOHL DV4000	SBL001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Skid-steer		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Flat Deck Truck		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Mini-Crane		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Marine Patrol Boat		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	MECHANICS TRUCK,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	SKELETON TRAILER,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	SKELETON TRAILER,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		CATERPILLAR 2620 SKID STEER LOADER C/W BUCKET (BOBCAT) S/N		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GENSET RADIATOR		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GENSET RADIATOR		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SW-95 IRONWORKER		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SW-95 IRONWORKER		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		KNEE MILL		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		KNEE MILL		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		BANDSAW		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		BANDSAW		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		LATHE		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	141	SA-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment		Jump Conveyor		12	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	230	2,556	23,020	25,560	51,136	1	12	100%	0%	0%	100%	51,136	0	0	51,136	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		17,045	0	17,045	0	0	0	0	17,045
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Reclaim Feeding, Line 2	Reclaim Feeding, Line 2	ML-PRO-SHL-010-RFL01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	0	0	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Reclaim Feeding, Line 2	Reclaim Feeding, Line 3	ML-PRO-SHL-010-RFL03	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	0	0	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Reclaim Feeding, Line 2	Reclaim Feeding, Line 4	ML-PRO-SHL-010-RFL04	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	0	0	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	141	SA-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment		Feeder (Small)		3	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	58	639	5,755	6,390	12,784	1	3	100%	0%	0%	100%	12,784	0	0	12,784	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		4,261	0	4,261	0	0	0	0	4,261
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	141	SA-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment		Screener		1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	141	SA-	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment		Cone Crusher		1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type B Construction 2BC-MRY1416	Modified (2017A)	2017	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
2000	Milne Port	2300	Material Handling	2340	Stockpile	2341	Ore Stacking System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Ore Stockpile Laydown		230,546	m2	0.0	0.1	1.3	0.4	1.8	2,926	33,717	292,560	91,422	417,699	0	0	100%	0%	0%	100%	417,699	0	0	417,699	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		139,233	139,233	139,233	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2341	Ore Stacking System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Ore Stockpile Pad Expansion		82,000	m2	0.0	0.1	1.3	0.4	1.8	1,041	11,993	104,057	32,517	148,566	0	0	100%	0%	0%	100%	148,566	0	0	148,566	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%	33%	33%						0		49,522	49,522	49,522	0	0	0	0	0

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M: Year 0 - %	C&M: Year 0+1 - %	Closure: Year 1 - %	Closure: Year 2 - %	Closure: Year 3 - %	Post Closure: Year 4 - %	Post Closure: Year 5 - %	Post Closure: Year 6 - %	Post Closure: Year 7 - %	Post Closure: Year 8 - %	C&M: Year 0 - Cost ($)	C&M: Year 0+1 - Cost ($)	Closure: Year 1 - Cost ($)	Closure: Year 2 - Cost ($)	Closure: Year 3 - Cost ($)	Post Closure: Year 4 - Cost ($)	Post Closure: Year 5 - Cost ($)	Post Closure: Year 6 - Cost ($)	Post Closure: Year 7 - Cost ($)	Post Closure: Year 8 - Cost ($)
2000	Milne Port	2300	Material Handling	2340	Stockpile	2341	Ore Stacking System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Ore Stockpile Footprints		128,866	m2	0.0	0.1	1.3	0.4	1.8	1,635	18,847	163,529	51,101	233,477	0	0	100%	0%	0%	100%	233,477	0	0	233,477	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		77,826	77,826	77,826	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	129	CV-	CV	Reclaim Conveyor	CV	Mechanical Equipment	Reclaim Conveyor		CONVEYING - RECLAIM CONVEYOR - FAM L: 850000, W: 1524, H: 47000 VERTICAL LIFT SEE REMARKS kg	2342-CV-001	1	Ea	5,018	75,276	501,405	752,760	1,329,441	5,018	75,276	501,405	752,760	1,329,441	1,020	1,020	100%	0%	0%	100%	1,329,441	0	0	1,329,441	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		443,147	443,147	443,147	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2342	Ore Reclaim System	129	CV-	CV	Reclaim Conveyor	CV	Mechanical Equipment	Reclaim Conveyor		'Cross' Conveyor at Ore Stockpile Pad (assume 1/6 length of existing shiploader conveyor)		0.17	Ea	5,018	75,276	501,405	752,760	1,329,441	836	12,546	83,568	125,460	221,574	1,020	170	100%	0%	0%	100%	221,574	0	0	221,574	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		73,858	73,858	73,858	0	0	0	0	0
2000	Milne Port	2300	Material Handling	2340	Stockpile	2345	Stockpile Settling Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Ore Stockpile Settling Ponds		11,424	m2	0.0	0.2	4.4	0.7	5.3	508	2,034	50,824	8,163	61,021	0	0	100%	0%	0%	100%	61,021	0	0	61,021	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		20,340	20,340	20,340	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2522	Services Equipment		FRF	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Heater	Frost Fighter Heater	ML-FAC-POH-010	38	Ea	8.1	106.5	809.3	1,065.0	1,980.8	308	4,047	30,753	40,470	75,270	1	19	100%	0%	0%	100%	75,270	0	0	75,270	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		25,090	0	25,090	0	0	0	0	25,090
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2522	Services Equipment	317	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment		Light Plant		10	Ea	8.1	106.5	809.3	1,065.0	1,980.8	81	1,065	8,093	10,650	19,808	1	5	100%	0%	0%	100%	19,808	0	0	19,808	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		6,603	0	6,603	0	0	0	0	6,603
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2522	Services Equipment	317	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment		Frost Fighter Heater		10	Ea	8.1	106.5	809.3	1,065.0	1,980.8	81	1,065	8,093	10,650	19,808	1	5	100%	0%	0%	100%	19,808	0	0	19,808	Type B Construction 2BC-MRY1416	Added	2017	Direct			33%		33%					33%	0		6,603	0	6,603	0	0	0	0	6,603
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2511	Service Core	227	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Service Core - Demolish and Decontaminate Building - Special Modular / Prefabricated	2511-BLD-001	1,388	m2	0.2	3.4	22.4	33.6	59.4	311	4,669	31,098	46,688	82,454	1	1,388	100%	0%	0%	100%	82,454	0	0	82,454	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		27,485	27,485	27,485	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2511	Service Core	230	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Office - Demolish and Decontaminate Building - Special Modular / Prefabricated	2511-BLD-002	335	m2	0.2	3.4	22.4	33.6	59.4	75	1,125	7,494	11,250	19,869	1	335	100%	0%	0%	100%	19,869	0	0	19,869	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		6,623	6,623	6,623	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2511	Service Core	233	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Laundry - Demolish and Decontaminate Building - Special Modular / Prefabricated	2511-BLD-003	424	m2	0.2	3.4	22.4	33.6	59.4	95	1,425	9,492	14,250	25,167	1	424	100%	0%	0%	100%	25,167	0	0	25,167	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		8,389	8,389	8,389	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2512	Accommodation Wings	237	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing BA - Demolish and Decontaminate Building - Special Modular / Prefabricated	2512-BLD-001	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2512	Accommodation Wings	240	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing BB - Demolish and Decontaminate Building - Special Modular / Prefabricated	2512-BLD-002	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2512	Accommodation Wings	243	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing BC - Demolish and Decontaminate Building - Special Modular / Prefabricated	2512-BLD-003	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2512	Accommodation Wings	246	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing BD - Demolish and Decontaminate Building - Special Modular / Prefabricated	2512-BLD-004	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	250	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Emergency Response Office - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	2513-BLD-001	89	m2	0.2	3.4	22.4	33.6	59.4	20	300	1,998	3,000	5,298	1	89	100%	0%	0%	100%	5,298	0	0	5,298	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,766	1,766	1,766	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	251	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Response Office - Demolish and foundations - Timber Cribbing to Elevate Building	2513-BLD-001	89	m2	0.1	1.2	7.8	11.8	20.8	11	105	699	1,050	1,854	0	27	100%	0%	0%	100%	1,854	0	0	1,854	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		618	618	618	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	253	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Emergency Response Garage - Demolish and Decontaminate Building - Fold-away Building (Steel)	2513-BLD-002	279	m2	0.2	2.4	15.7	23.5	41.6	44	656	4,371	6,563	11,590	1	279	100%	0%	0%	100%	11,590	0	0	11,590	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,863	3,863	3,863	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	254	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Emergency Response Garage - Demolish and foundations - Precast Footing (Perimeter Beam)	2513-BLD-002	279	m2	0.1	2.2	14.5	21.8	38.5	40	607	4,045	6,073	10,725	1	209	100%	0%	0%	100%	10,725	0	0	10,725	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,575	3,575	3,575	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	255	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Emergency Response Garage - Demolish floor finish - Slab on grade C/W Drainage	2513-BLD-002	279	m2	0.1	1.9	12.5	18.8	33.1	35	523	3,482	5,228	9,233	0	0	100%	0%	0%	100%	9,233	0	0	9,233	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,078	3,078	3,078	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	265	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - EMERGENCY RESPONSE OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791, W: 1829, H: 610	2513-TK-003	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	266	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - EMERGENCY RESPONSE OFFICE RAW WATER TANK - NORWESCO L: 1613, W: 737, H: 1676	2513-TK-004	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2510	Accommodations Area	2513	Emergency Services Building	267	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE EMERGENCY RESPONSE GARAGE DIESEL FUEL TANK - DTE ULC601-07	2513-TK-023	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	270	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Maintenance Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2521-BLD-001	892	m2	0.6	2.4	56.0	84.1	142.4	500	2,100	49,957	75,000	127,057	1	892	100%	0%	0%	100%	127,057	0	0	127,057	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		42,352	42,352	42,352	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	271	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Maintenance Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2521-BLD-001	892	m2	0.1	2.2	14.5	21.8	38.5	130	1,943	12,944	19,433	34,320	1	669	100%	0%	0%	100%	34,320	0	0	34,320	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		11,440	11,440	11,440	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	272	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Maintenance Building - Demolish floor finish - Slab on grade C/W Drainage	2521-BLD-001	892	m2	0.1	1.9	12.5	18.8	33.1	112	1,673	11,143	16,729	29,544	0	0	100%	0%	0%	100%	29,544	0	0	29,544	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		9,848	9,848	9,848	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	273	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Welding Shop Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2521-BLD-002	149	m2	0.6	2.4	56.0	84.1	142.4	83	350	8,326	12,500	21,176	1	149	100%	0%	0%	100%	21,176	0	0	21,176	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		7,059	7,059	7,059	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	274	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Welding Shop Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2521-BLD-002	149	m2	0.1	2.2	14.5	21.8	38.5	22	324	2,157	3,239	5,720	1	112	100%	0%	0%	100%	5,720	0	0	5,720	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,907	1,907	1,907	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	275	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Welding Shop Building - Demolish floor finish - Slab on grade	2521-BLD-002	149	m2	0.1	1.9	12.5	18.8	33.1	19	279	1,857	2,788	4,924	0	0	100%	0%	0%	100%	4,924	0	0	4,924	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,641	1,641	1,641	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	276	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Workshop Office Building - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	2521-BLD-003	268	m2	0.6	3.4	56.0	84.1	143.4	150	900	14,987	22,500	38,387	1	268	100%	0%	0%	100%	38,387	0	0	38,387	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		12,796	12,796	12,796	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	277	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Workshop Office Building - Demolish and foundations - Timber Cribbing to Elevate Building	2521-BLD-003	268	m2	0.1	1.2	7.8	11.8	20.8	33	315	2,098	3,150	5,563	0	80	100%	0%	0%	100%	5,563	0	0	5,563	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,854	1,854	1,854	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	279	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Workshop Office Washcar - Demolish and Decontaminate Building - Trailer - Single	2521-BLD-004	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	280	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Workshop Office Washcar - Demolish and foundations - Timber Cribbing to Elevate Building	2521-BLD-004	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	292	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE WELDING SHOP DIESEL FUEL TANK - DTE ULC601-07	2521-TK-005	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	293	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MAINTENANCE BUILDING DIESEL FUEL TANK - DTE ULC601-07	2521-TK-013	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	294	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - WORKSHOP OFFICE WASHCAR RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803, W: 1245, H: 1346	2521-TK-050	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	295	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - WORKSHOP OFFICE WASHCAR SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL	2521-TK-053	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings	296	In Meters	piping	Piping	Piping	Bulks	Piping		Maintenance Building Utility Piping - Piping Installation - Water, air and lube piping inside building	2521.5-P	255	m	0.3	3.8	25.0	37.5	66.2	64	956	6,369	9,563	16,888	0	3	100%	0%	100%	0%	16,888	0	16,888	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,629	5,629	5,629	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2520	Services Area	2521	Services Buildings			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Anmar Workshop		1,670	m2	0.0	0.2	4.4	0.7	5.3	74	297	7,430	1,193	8,865	0	0	100%	0%	0%	100%	8,865	0	0	8,865	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%	33%	33%						0		2,955	2,955	2,955	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	327	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-001	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	330	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-002	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	333	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #3 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-003	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0

Baffinland

'Mary River Project - Complete Project Security Assessment - Estimate Breakdown Structure'
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	336	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #4 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-004	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	339	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #5 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-005	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	342	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #6 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-006	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	345	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #7 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-007	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	348	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #8 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-008	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	351	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-009	75	m2	0.6	3.4	56.0	84.1	143.4	42	253	4,215	6,328	10,796	1	75	100%	0%	0%	100%	10,796	0	0	10,796	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,599	3,599	3,599	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	354	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2530-BLD-010	75	m2	0.6	3.4	56.0	84.1	143.4	42	253	4,215	6,328	10,796	1	75	100%	0%	0%	100%	10,796	0	0	10,796	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,599	3,599	3,599	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation	357	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Power Generation Stores - Demolish and Decontaminate Building - ISO Shipping Container	2530-BLD-011	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,422	1,422	1,422	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Electrical office - Demolish and Decontaminate Building - Fold-away Building (Steel)	2530-BLD-BIM-001	20	m2	0.2	3.4	22.4	33.6	59.4	4	67	448	673	1,188	1	20	100%	0%	0%	100%	1,188	0	0	1,188	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		396	396	396	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation		BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Electrical Shop - Demolish and Decontaminate Building - Fold-away Building (Steel)	2530-BLD-BIM-002	56	m2	0.2	2.4	15.7	23.5	41.6	9	132	878	1,318	2,328	1	56	100%	0%	0%	100%	2,328	0	0	2,328	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		776	776	776	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2530	Power Generation	2530	Power Generation		BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Electrical Shop - Demolish and foundations - Precast Footing (Perimeter Beam)	2530-BLD-BIM-002	56	m2	0.1	2.2	14.5	21.8	38.5	8	122	812	1,220	2,154	1	42	100%	0%	0%	100%	2,154	0	0	2,154	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		718	718	718	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and	2540	Waste Management (building and	361	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Waste Management Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2540-BLD-001	446	m2	0.6	2.4	56.0	84.1	142.4	250	1,050	24,978	37,500	63,528	1	446	100%	0%	0%	100%	63,528	0	0	63,528	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		21,176	21,176	21,176	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and	2540	Waste Management (building and	362	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Waste Management Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2540-BLD-001	446	m2	0.1	2.2	14.5	21.8	38.5	65	972	6,472	9,716	17,160	1	335	100%	0%	0%	100%	17,160	0	0	17,160	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,720	5,720	5,720	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and	2540	Waste Management (building and	363	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Waste Management Building - Demolish floor finish - Slab on grade C/W Drainage	2540-BLD-001	446	m2	0.1	1.9	12.5	18.8	33.1	56	836	5,571	8,364	14,772	0	0	100%	0%	0%	100%	14,772	0	0	14,772	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		4,924	4,924	4,924	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and	2540	Waste Management (building and	364	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Waste Incinerators - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	2540-VP-001	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,914	4,375	7,464	1	52	100%	0%	0%	100%	7,464	0	0	7,464	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,488	2,488	2,488	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and incinerator)	2540	Waste Management (building and incinerator)	374	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE WASTE MANAGEMENT BUILDING DIESEL FUEL TANK - DTE ULC601-07	2540-TK-003	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2540	Waste Management (building and	2540	Waste Management (building and	375	VP-	VP1	VENDOR PKG - Incenerator	VP1	Packaged Facilities	Incinerator		WASTE INCINERATOR VENDOR PACKAGE	2540-VP-001	1	Ea	47.0	480.0	4,695.9	4,800.0	9,975.9	47	480	4,696	4,800	9,976	329	329	100%	0%	0%	100%	9,976	0	0	9,976	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,325	3,325	3,325	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Landfarm		12,933	m2	**0.0**	**0.2**	**4.4**	**0.7**	**5.3**	**575**	**2,303**	**57,539**	**9,241**	69,083	0	0	100%	0%	0%	100%	69,083	0	0	69,083	Type B Construction 2BC-MRY1416	Modified	2014	Direct			33%	33%	33%						0		23,028	23,028	23,028	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-1	2,000	m2	0.04	0.18	4.4	0.71	5.3	89	356	8,898	1,429	10,617	0	0	100%	0%	0%	100%	10,617	0	0	10,617	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		3,539	3,539	3,539	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-2	272	m2	0.04	0.18	4.4	0.71	5.3	12	48	1,210	194	1,444	0	0	100%	0%	0%	100%	1,444	0	0	1,444	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		481	481	481	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-3	678	m2	0.04	0.18	4.4	0.71	5.3	30	121	3,016	484	3,599	0	0	100%	0%	0%	100%	3,599	0	0	3,599	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,200	1,200	1,200	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-4	597	m2	0.04	0.18	4.4	0.71	5.3	27	106	2,656	427	3,169	0	0	100%	0%	0%	100%	3,169	0	0	3,169	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,056	1,056	1,056	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-5	652	m2	0.04	0.18	4.4	0.71	5.3	29	116	2,901	466	3,461	0	0	100%	0%	0%	100%	3,461	0	0	3,461	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,154	1,154	1,154	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MP-HWB-6	34	m2	0.04	0.18	4.4	0.71	5.3	2	6	151	24	180	0	0	100%	0%	0%	100%	180	0	0	180	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		60	60	60	0	0	0	0	0
2000	Milne Port	2500	Non Process Facilities	2550	Waste Disposal	2550	Waste Disposal			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Snow Dump		3,189	m2	0.04	0.18	4.4	0.71	5.3	142	568	14,188	2,279	16,928	0	0	100%	0%	0%	100%	16,928	0	0	16,928	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		5,643	5,643	5,643	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System		ENE	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Diesel Module	Diesel Module	ML-FUM-FDI-010	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System		ENE	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Jet A1 Module	Jet A1 Module	ML-FUM-FDI-020	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2611	Containment Dyke			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Fuel Tank Farm Berm		25,393	m2	0.0	0.2	4.4	0.7	5.3	1,130	4,521	112,973	18,144	135,639	0	0	100%	0%	0%	100%	135,639	0	0	135,639	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		67,819	67,819	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	384	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Diesel Fuel Dispensing Module - Demolish and Decontaminate Building - ISO Shipping Container	2613-FD-013	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,066	1,066	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	387	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Diesel Fuel Dispensing Module - Demolish and Decontaminate Building - ISO Shipping Container	2613-FD-014	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		2,133	2,133	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	398	TK-	MT4-d	Largest Diesel Tanks (10M L to 12M L)	MT4-d	Mechanical Equipment	Largest Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 27800 DI H: 15250	2613-TK-001	1	Ea	679.4	9,417.0	67,881.2	94,170.0	171,468.2	679	9,417	67,881	94,170	171,468	160	160	100%	0%	0%	100%	171,468	0	0	171,468	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		85,734	85,734	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	399	TK-	MT4-d	Largest Diesel Tanks (10M L to 12M L)	MT4-d	Mechanical Equipment	Largest Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 27800 DI H: 15250	2613-TK-002	1	Ea	679.4	9,417.0	67,881.2	94,170.0	171,468.2	679	9,417	67,881	94,170	171,468	160	160	100%	0%	0%	100%	171,468	0	0	171,468	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		85,734	85,734	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	400	TK-	MT4-d	Largest Diesel Tanks (10M L to 12M L)	MT4-d	Mechanical Equipment	Largest Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 27800 DI H: 15250	2613-TK-003	1	Ea	679.4	9,417.0	67,881.2	94,170.0	171,468.2	679	9,417	67,881	94,170	171,468	160	160	100%	0%	0%	100%	171,468	0	0	171,468	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		85,734	85,734	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	401	TK-	MT4-d	Largest Diesel Tanks (10M L to 12M L)	MT4-d	Mechanical Equipment	Largest Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 27800 DI H: 15250	2613-TK-004	1	Ea	679.4	9,417.0	67,881.2	94,170.0	171,468.2	679	9,417	67,881	94,170	171,468	160	160	100%	0%	0%	100%	171,468	0	0	171,468	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		85,734	85,734	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	402	TK-	MT3-d	Large Diesel Tanks Load and Transport (5M L)	MT3-d	Mechanical Equipment	Large Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 25600 DI H: 9760	2613-TK-005	1	Ea	418.6	5,865.0	41,823.7	58,650.0	106,338.7	419	5,865	41,824	58,650	106,339	80	80	100%	0%	0%	100%	106,339	0	0	106,339	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		53,169	53,169	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System	403	TK-	MT3-d	Large Diesel Tanks Load and Transport (5M L)	MT3-d	Mechanical Equipment	Large Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 25600 DI H: 9760	2613-TK-006	1	Ea	418.6	5,865.0	41,823.7	58,650.0	106,338.7	419	5,865	41,824	58,650	106,339	80	80	100%	0%	0%	100%	106,339	0	0	106,339	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		53,169	53,169	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2613	Arctic Diesel System		TK-	MT5-d	Medium Mobile Diesel Tanks (3000 L to 500k L)	MT5-d	Mechanical Equipment	Medium Mobile Diesel Tanks		50,000 L Portable Fuel Dispensing Unit		2	Ea	42.7	564.8	4,268.8	5,647.5	10,481.0	85	1,130	8,538	11,295	20,962	30	60	100%	0%	0%	100%	20,962	0	0	20,962	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		6,987	0	6,987	0	0	0	0	6,987
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	405	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Jet-A1 Fuel Dispensing Module - Demolish and Decontaminate Building - ISO Shipping Container	2614-FD-011	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,066	1,066	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	413	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - JET-A1 TANK W: 10250 DI H: 9140	2614-TK-007	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	414	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - JET-A1 TANK W: 10250 DI H: 9140	2614-TK-008	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	415	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - JET-A1 TANK W: 10250 DI H: 9140	2614-TK-009	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2614	Jet-A System	416	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - JET-A1 TANK W: 10250 DI H: 9140	2614-TK-010	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2615	Marine Pipeline	418	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Marine Manifold Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2615-BLD-001	32	m2	0.6	2.4	56.0	84.1	142.4	18	74	1,769	2,656	4,500	1	32	100%	0%	0%	100%	4,500	0	0	4,500	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,500	1,500	1,500	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2615	Marine Pipeline	419	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Marine Manifold Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2615-BLD-001	32	m2	0.6	2.4	56.0	84.1	142.4	18	74	1,769	2,656	4,500	1	32	100%	0%	0%	100%	4,500	0	0	4,500	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,500	1,500	1,500	0	0	0	0	0
2000	Milne Port	2600	Fuel System	2610	Milne Tank Farm	2616	Weatherhaven camp			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Weatherhaven genset fuel bladder berm		500	m2	0.0	0.2	4.4	0.7	5.3	22	89	2,224	357	2,654	0	0	100%	0%	0%	100%	2,654	0	0	2,654	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		885	885	885	0	0	0	0	0
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	465	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - TREATED EFFLUENT TANK	2731-TK-002	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type B Construction 2BC-MRY1416	Added	2014	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
2000	Milne Port	2700	Site Utilities	2610	Milne Tank Farm	2613	Arctic Diesel System			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		50,000 L Portable Fuel Dispensing Unit		1,364	m2	0.0	0.2	4.4	0.7	5.3	61	243	6,068	975	7,286	0	0	100%	0%	0%	100%	7,286	0	0	7,286	Type B Construction 2BC-MRY1416	Added	2016	Direct			33%	33%	33%						0		2,429	2,429	2,429	0	0	0	0	0

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	431	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Water Building - Demolish and Decontaminate Building - Fold-away Building (Steel)
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	432	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Water Building - Demolish and foundations - Precast Footing (Perimeter Beam)
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	448	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - RAW WATER TANK
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	449	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - FIRE WATER TANK
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	450	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - POTABLE WATER STORAGE TANK
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	451	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - BACKWASH SETTLING TANK
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	452	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE WATER BUILDING DIESEL FUEL TANK - DTE ULC601-07
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems	453	VP-	VP2	VENDOR PKG - Potable Water	VP2	Packaged Facilities	Potable Water		POTABLE WATER TREATMENT PLANT VENDOR PACKAGE VENDOR PACKAGE
2000	Milne Port	2700	Site Utilities	2720	Water Systems	2720	Water Systems		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - POTABLE WATER STORAGE TANK (20 m3)
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	456	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Sewage Chemical Storage Container - Demolish and Decontaminate Building - ISO Shipping Container
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	459	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Sewage Treatment Plant - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	468	In Meters	piping	Piping	Piping	Bulks	Piping		Sewage Treatment Piping - Piping Installation - Sewage truck bldg to STP
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	466	VP-	VP3	VENDOR PKG - Sewage Treatment Plant	VP3	Packaged Facilities	Sewage Treatment Plant		SEWAGE TREATMENT PLANT VENDOR PACKAGE
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	470	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Sewage Truck Building - Demolish and Decontaminate Building - Fold-away Building (Steel)
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	471	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Sewage Truck Building - Demolish and foundations - Precast Footing (Perimeter Beam)
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	477	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE SEWAGE TRUCK BUILDING DIESEL FUEL TANK - DTE ULC601-07
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2734	Treated Effluent Discharge	480	In Meters	piping	Piping	Piping	Bulks	Piping		Treated Effluent Piping - Piping Installation - STP to effluent pond and ocean discharge
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2735	Off Spec Effluent Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		PWSP
2000	Milne Port	2700	Site Utilities	2730	Sewage System	2735	Off Spec Effluent Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		PWSP
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	483	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accomodation Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	486	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accomodation Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	489	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	492	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	495	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Fuel Tank Farm E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	498	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 5kV - Electrical distribution system from power gen to e-
2000	Milne Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	499	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 600V - Connections from e-house to facilities
2000	Milne Port	2700	Site Utilities	0	Power Distribution System		Power Distribution System	499	In Meters	cable	Cable	Cable	Bulks	Cable		Addtitional outdoor lighting for safety (with cables) at Port Site
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	504	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 1 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	507	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 2 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	510	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 3 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	513	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 4 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3112	Communications Facility No. 2	517	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 5 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3112	Communications Facility No. 2	520	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 6 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3112	Communications Facility No. 2	523	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 7 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3112	Communications Facility No. 2	526	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 8 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3113	Communications Facility No. 3	530	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 9 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3113	Communications Facility No. 3	533	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 10 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3113	Communications Facility No. 3	536	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 11 - Demolish Building - ISO Shipping Container
3000	Tote Road	3100	General	3130	Site Development	3130	Site Development			A4	Grade & Re-Contour Type A	A4	Site Works	Grade and Re-Contour		Unidentified High Priority Disturbed Areas
3000	Tote Road	3100	General	3130	Site Development	3130	Site Development			A4	Grade & Re-Contour Type A	A4	Site Works	Grade and Re-Contour		KM 97 Borrow Source
3000	Tote Road	3100	General	3130	Site Development	3130	Site Development			A4	Grade & Re-Contour Type A	A4	Site Works	Grade and Re-Contour		KM 97 Borrow Source (marginal increase in 2017)
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade			Cu	Culvert Removal	cu	Site Works	Culvert Removal		Culverts - IOL
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade			Cu	Culvert Removal	cu	Site Works	Culvert Removal		Culverts - Crown
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Out-of-Service Tote Road
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade		BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Mobile Maintenance Depot - Demolish and Decontaminate Building - Fold-away Building (Steel)
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade		BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Mobile Maintenance Depot - Demolish floor finish - Slab on grade C/W Drainage
3000	Tote Road	3100	General	3130	Site Development	3131	Road Upgrade			A5	Liner Removal	A5	Site Works	Liner Removal	Liner Removal	Mobile Maintenance Depot -Liner Removal
3000	Tote Road	3100	General	3130	Site Development	3132	River Crossing at STA 17			Br	Bridge Removal	Br	Site Works	Bridge Removal		Bridge Removal
3000	Tote Road	3100	General	3130	Site Development	3133	River Crossing at STA 62			Br	Bridge Removal	Br	Site Works	Bridge Removal		Bridge Removal
3000	Tote Road	3100	General	3130	Site Development	3134	River Crossing at STA 80			Br	Bridge Removal	Br	Site Works	Bridge Removal		Bridge Removal

Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)
2720-BLD-001	390	m2	0.2	2.4	15.7	23.5	41.6	61	919	6,120	9,188	16,226	1	390	100%	0%	0%	100%	16,226	0	0	16,226
2720-BLD-001	390	m2	0.1	2.2	14.5	21.8	38.5	57	850	5,663	8,502	15,015	1	293	100%	0%	0%	100%	15,015	0	0	15,015
2720-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387
2720-TK-007	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387
2720-TK-008	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387
2720-TK-011	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387
2720-TK-033	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694
2720-VP-020	1	Ea	47.0	480.0	4,695.9	4,800.0	9,975.9	47	480	4,696	4,800	9,976	329	329	100%	0%	100%	0%	9,976	0	9,976	0
	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148
2731-BLD-001	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265
2731-VP-005	178	m2	0.6	3.4	56.0	84.1	143.4	100	600	9,991	15,000	25,591	1	178	100%	0%	0%	100%	25,591	0	0	25,591
2731.2-P	258	m	0.3	3.8	25.0	37.5	66.2	65	968	6,444	9,675	17,087	0	3	100%	0%	100%	0%	17,087	0	17,087	0
2731-VP-005	1	Ea	51.0	540.0	5,095.6	5,400.0	11,035.6	51	540	5,096	5,400	11,036	329	329	100%	0%	100%	0%	11,036	0	11,036	0
2732-BLD-001	56	m2	0.6	2.4	56.0	84.1	142.4	31	131	3,122	4,688	7,941	1	56	100%	0%	0%	100%	7,941	0	0	7,941
2732-BLD-001	56	m2	0.1	2.2	14.5	21.8	38.5	8	121	809	1,215	2,145	1	42	100%	0%	0%	100%	2,145	0	0	2,145
2732-TK-003	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694
2734.1-P	2,595	m	0.3	3.8	25.0	37.5	66.2	649	9,731	64,819	97,313	171,863	0	26	100%	0%	100%	0%	171,863	0	171,863	0
PWSP-1	4,180	m2	0.0	0.2	4.4	0.7	5.3	186	744	18,597	2,987	22,189	0	0	100%	0%	0%	100%	22,189	0	0	22,189
PWSP-2	4,260	m2	0.0	0.2	4.4	0.7	5.3	190	758	18,953	3,044	22,613	0	0	100%	0%	0%	100%	22,613	0	0	22,613
2750-BLD-001	59	m2	0.2	3.4	22.4	33.6	59.4	13	200	1,332	2,000	3,532	1	59	100%	0%	0%	100%	3,532	0	0	3,532
2750-BLD-002	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208
2750-BLD-003	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208
2750-BLD-004	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208
2750-BLD-005	2	m2	0.2	3.4	22.4	33.6	59.4	1	8	52	78	138	1	2	100%	0%	0%	100%	138	0	0	138
2750.2-E	6,100	m	0.1	1.5	10.0	15.0	26.5	610	9,150	60,947	91,500	161,597	0	61	100%	0%	0%	100%	161,597	0	0	161,597
2750.3-E	5,000	m	0.1	1.5	10.0	15.0	26.5	500	7,500	49,957	75,000	132,457	0	50	100%	0%	0%	100%	132,457	0	0	132,457
	3,500	m	0.1	1.5	10.0	15.0	26.5	350	5,250	34,970	52,500	92,720	0	35	100%	0%	0%	100%	92,720	0	0	92,720
3111-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3111-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3111-BLD-003	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3111-BLD-004	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3112-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3112-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3112-BLD-003	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3112-BLD-004	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3113-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3113-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
3113-BLD-003	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442
	105,359	m2	0.0	0.2	1.9	0.6	2.72	2,005	23,113	200,549	62,669	286,096	0	0	100%	0%	0%	100%	286,096	0	0	286,096
	157,012	m2	0.0	0.2	1.9	0.6	2.7	2,989	34,445	298,870	93,394	426,708	0	0	100%	0%	0%	100%	426,708	0	0	426,708
	1,000	m2	0.0	0.2	1.9	0.6	2.7	19	219	1,903	595	2,718	0	0	100%	0%	0%	100%	2,718	0	0	2,718
	372	Ea	6.0	45.0	599.5	450.0	1,094.5	2,232	16,740	223,007	167,400	407,147	0	0	100%	0%	0%	100%	407,147	0	0	407,147
	11	Ea	6.0	45.0	599.5	450.0	1,094.5	66	495	6,594	4,950	12,039	0	0	0%	100%	0%	100%	0	12,039	0	12,039
	266,500	m2	0.0	0.1	1.3	0.4	1.8	3,382	38,976	338,185	105,679	482,444	0	0	100%	0%	0%	100%	482,444	0	0	482,444
	682	m2	0.6	2.4	56.0	84.1	142.4	382	1,605	38,187	57,331	97,123	1	682	0%	100%	0%	100%	0	97,123	0	97,123
	682	m2	0.1	1.9	12.5	18.8	33.1	85	1,279	8,518	12,788	22,584	0	0	0%	100%	0%	100%	0	22,584	0	22,584
	682	m2	0.03	0.03	3.2	0.32	3.5	22	22	2,169	217	2,386	0	0	0%	100%	0%	100%	0	2,386	0	2,386
	1	Ea	761.9	11,428.6	76,124.5	114,285.7	201,838.8	762	11,429	76,124	114,286	201,839	5,000	5,000	0%	100%	0%	100%	0	201,839	0	201,839
	1	Ea	761.9	11,428.6	76,124.5	114,285.7	201,838.8	762	11,429	76,124	114,286	201,839	5,000	5,000	100%	0%	0%	100%	201,839	0	0	201,839
	1	Ea	761.9	11,428.6	76,124.5	114,285.7	201,838.8	762	11,429	76,124	114,286	201,839	5,000	5,000	100%	0%	0%	100%	201,839	0	0	201,839

License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M: Year 0 - %	C&M: Year 0+1 - %	Closure: Year 1 - %	Closure: Year 2 - %	Closure: Year 3 - %	Post Closure: Year 4 - %	Post Closure: Year 5 - %	Post Closure: Year 6 - %	Post Closure: Year 7 - %	Post Closure: Year 8 - %	C&M: Year 0 - Cost ($)	C&M: Year 0+1 - Cost ($)	Closure: Year 1 - Cost ($)	Closure: Year 2 - Cost ($)	Closure: Year 3 - Cost ($)	Post Closure: Year 4 - Cost ($)	Post Closure: Year 5 - Cost ($)	Post Closure: Year 6 - Cost ($)	Post Closure: Year 7 - Cost ($)	Post Closure: Year 8 - Cost ($)
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,409	5,409	5,409	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,005	5,005	5,005	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,325	3,325	3,325	0	0	0	0	0
Type A 2AM-MRY1325	Confirmed	2015 A	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		2,133	2,133	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		12,796	12,796	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		8,543	8,543	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		5,518	5,518	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,971	3,971	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,073	1,073	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		57,288	57,288	57,288	0	0	0	0	0
Type B Construction 2BC-MRY1416	Modified	2014	Direct			33%	33%	33%						0		7,396	7,396	7,396	0	0	0	0	0
Type B Construction 2BC-MRY1416	Added	2016	Direct			33%	33%	33%						0		7,538	7,538	7,538	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,177	1,177	1,177	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		736	736	736	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		69	69	0	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		53,866	53,866	53,866	0	0	0	0	0
Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		44,152	44,152	44,152	0	0	0	0	0
Type B Construction 2BC-MRY1416		2017	Direct			33%	33%	33%						0		30,907	30,907	30,907	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
Type A 2AM-MRY1325	Added	2015 R	Direct			50%	50%							0		143,048	143,048	0	0	0	0	0	0
Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		213,354	213,354	0	0	0	0	0	0
Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		1,359	1,359	0	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct				50%	50%						0		0	203,573	203,573	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct				50%	50%						0		0	6,020	6,020	0	0	0	0	0
Type A 2AM-MRY1325	Added	2015 R	Direct				50%	50%						0		0	241,222	241,222	0	0	0	0	0
Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		32,374	32,374	32,374	0	0	0	0	0
Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		7,528	7,528	7,528	0	0	0	0	0
Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		795	795	795	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		67,280	67,280	67,280	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		67,280	67,280	67,280	0	0	0	0	0
Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		67,280	67,280	67,280	0	0	0	0	0

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - % (C&M)	Year 0+1 - % (C&M)	Year 1 - % (Closure)	Year 2 - % (Closure)	Year 3 - % (Closure)	Year 4 - % (Post Closure)	Year 5 - % (Post Closure)	Year 6 - % (Post Closure)	Year 7 - % (Post Closure)	Year 8 - % (Post Closure)	Year 0 - Cost ($) (C&M)	Year 0+1 - Cost ($) (C&M)	Year 1 - Cost ($) (Closure)	Year 2 - Cost ($) (Closure)	Year 3 - Cost ($) (Closure)	Year 4 - Cost ($) (Post Closure)	Year 5 - Cost ($) (Post Closure)	Year 6 - Cost ($) (Post Closure)	Year 7 - Cost ($) (Post Closure)	Year 8 - Cost ($) (Post Closure)
3000	Tote Road	3100	General	3130	Site Development	3135	River Crossing at STA 97			Br	Bridge Removal	Br	Site Works	Bridge Removal		Bridge Removal		1	Ea	761.9	11,428.6	76,124.5	114,285.7	201,838.8	762	11,429	76,124	114,286	201,839	5,000	5,000	100%	0%	0%	100%	201,839	0	0	201,839	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		67,280	67,280	67,280	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3136	Mary River			A3	Grade & Re-Contour	A9	Site Works	Grade and Re-Contour Building Footprints		Grade and Re-Contour Building Footprints		13,040	m2	0.0	0.1	1.3	0.4	1.8	165	1,907	16,548	5,171	23,626	0	0	100%	0%	0%	100%	23,626	0	0	23,626	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		7,875	7,875	7,875	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Borrow development areas		42,080	m2	0.0	0.1	1.3	0.4	1.8	534	6,154	53,399	16,687	76,240	0	0	100%	0%	0%	100%	76,240	0	0	76,240	Type A 2AM-MRY1325	Check	2014	Direct			33%	33%	33%						0		25,413	25,413	25,413	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q1			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q1 Quarry		64,200	m2	0.0	0.1	1.3	0.4	1.8	815	9,389	81,469	25,458	116,316	0	0	100%	0%	0%	100%	116,316	0	0	116,316	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		58,158	58,158	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q7			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q7 Quarry		53,050	m2	0.0	0.1	1.3	0.4	1.8	673	7,759	67,320	21,037	96,115	0	0	100%	0%	0%	100%	96,115	0	0	96,115	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		48,058	48,058	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q1			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q1 Quarry (addional maringal increase in 2017)		6,000	m2	0.0	0.1	1.3	0.4	1.8	76	878	7,614	2,379	10,871	0	0	100%	0%	0%	100%	10,871	0	0	10,871	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		5,435	5,435	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q11			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q11 Quarry		50,433	m2	0.0	0.1	1.3	0.4	1.8	640	7,376	63,999	19,999	91,374	0	0	100%	0%	0%	100%	91,374	0	0	91,374	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		45,687	45,687	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q11			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q18 Quarry		2,000	m2	0.0	0.1	1.3	0.4	1.8	25	293	2,538	793	3,624	0	0	100%	0%	0%	100%	3,624	0	0	3,624	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		1,812	1,812	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Borrow Source at P1			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P1 Borrow Source		75,820	m2	0.0	0.1	1.3	0.4	1.8	962	11,089	96,215	30,066	137,369	0	0	0%	100%	0%	100%	0	137,369	0	137,369	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		68,685	68,685	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q19			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q19 Quarry		18,760	m2	0.0	0.1	1.3	0.4	1.8	238	2,744	23,806	7,439	33,989	0	0	100%	0%	0%	100%	33,989	0	0	33,989	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		16,995	16,995	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q19			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q9 Quarry		15,166	m2	0.0	0.1	1.3	0.4	1.8	192	2,218	19,245	6,014	27,455	0	0	100%	0%	0%	100%	27,455	0	0	27,455	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		13,727	13,727	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q13			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q13 Quarry		6,350	m2	0.0	0.1	1.3	0.4	1.8	81	929	8,058	2,518	11,495	0	0	100%	0%	0%	100%	11,495	0	0	11,495	Type A 2AM-MRY1325	Added	2016	Direct			50%	50%							0		5,748	5,748	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q14			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q14 Quarry		13,440	m2	0.0	0.1	1.3	0.4	1.8	171	1,966	17,055	5,330	24,330	0	0	100%	0%	0%	100%	24,330	0	0	24,330	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		12,165	12,165	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q15			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q15 Quarry		10,680	m2	0.0	0.1	1.3	0.4	1.8	136	1,562	13,553	4,235	19,334	0	0	100%	0%	0%	100%	19,334	0	0	19,334	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		9,667	9,667	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at Q16A			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Q16A Quarry		11,240	m2	0.0	0.1	1.3	0.4	1.8	143	1,644	14,263	4,457	20,348	0	0	100%	0%	0%	100%	20,348	0	0	20,348	Type A 2AM-MRY1325	Added	2016	Direct			50%	50%							0		10,174	10,174	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P5			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P5 Borrow Source		4,600	m2	0.0	0.1	1.3	0.4	1.8	58	673	5,837	1,824	8,327	0	0	100%	0%	0%	100%	8,327	0	0	8,327	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		4,164	4,164	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P6			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P6 Borrow Source		7,500	m2	0.0	0.1	1.3	0.4	1.8	95	1,097	9,517	2,974	13,577	0	0	100%	0%	0%	100%	13,577	0	0	13,577	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		6,789	6,789	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P7			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P7 Borrow Source		8,100	m2	0.0	0.1	1.3	0.4	1.8	103	1,185	10,279	3,212	14,663	0	0	100%	0%	0%	100%	14,663	0	0	14,663	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		7,332	7,332	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P8			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P8 Borrow Source		8,385	m2	0.0	0.1	1.3	0.4	1.8	106	1,226	10,640	3,325	15,179	0	0	100%	0%	0%	100%	15,179	0	0	15,179	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		7,590	7,590	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P10			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P10 Borrow Source		19,344	m2	0.0	0.1	1.3	0.4	1.8	245	2,829	24,547	7,671	35,018	0	0	100%	0%	0%	100%	35,018	0	0	35,018	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		17,509	17,509	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P13			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P13 Borrow Source		8,456	m2	0.0	0.1	1.3	0.4	1.8	107	1,237	10,731	3,353	15,308	0	0	100%	0%	0%	100%	15,308	0	0	15,308	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		7,654	7,654	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P15			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Removal of Quarry and Borrow No Longer being Developed (Q9, Q14, Q15, P5, P6, P7, P8, P10, P13, P14, and P15)		-102,131	m2	0.0	0.1	1.3	0.4	1.8	-1,296	-14,937	-129,603	-40,500	-184,887	0	0	100%	0%	0%	100%	-184,887	0	0	-184,887	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		-92,444	-92,444	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P14			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P14 Borrow Source		3,160	m2	0.0	0.1	1.3	0.4	1.8	40	462	4,010	1,253	5,721	0	0	100%	0%	0%	100%	5,721	0	0	5,721	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		2,860	2,860	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Quarry at P15			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	P15 Borrow Source		3,300	m2	0.0	0.1	1.3	0.4	1.8	42	483	4,188	1,309	5,974	0	0	100%	0%	0%	100%	5,974	0	0	5,974	Type A 2AM-MRY1325	Removed (2017)	2016	Direct			50%	50%							0		2,987	2,987	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Borrow Source at Km 2			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Km 2 Borrow source		41,795	m2	0.0	0.1	1.3	0.4	1.8	530	6,113	53,037	16,574	75,723	0	0	100%	0%	0%	100%	75,723	0	0	75,723	Type A 2AM-MRY1325	Check	2015	Direct			100%								0		75,723	0	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Borrow Source at Km 2			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Km 2 Borrow source (marginal increase in 2017)		1,000	m2	0.0	0.1	1.3	0.4	1.8	13	146	1,269	397	1,812	0	0	100%	0%	0%	100%	1,812	0	0	1,812	Type A 2AM-MRY1325	Added	2017	Direct			100%								0		1,812	0	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3138	Unidentified Borrow Sources			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Unidentified Borrow Sources		697,910	m2	0.0	0.1	1.3	0.4	1.8	8,856	102,069	885,640	276,753	1,263,423	0	0	100%	0%	0%	100%	1,263,423	0	0	1,263,423	Type A 2AM-MRY1325	Added	2015 R	Direct			50%	50%							0		631,712	631,712	0	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3139	Infrastructure Pads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Explosive magazine pads along Tote Road		760	m2	0.0	0.1	1.3	0.4	1.8	10	111	964	301	1,377	0	0	100%	0%	0%	100%	1,377	0	0	1,377	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		459	459	459	0	0	0	0	0
3000	Tote Road	3100	General	3130	Site Development	3139	Infrastructure Pads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown at km 61		6,000	m2	0.0	0.1	1.3	0.4	1.8	76	878	7,614	2,379	10,862	0	0	100%	0%	0%	100%	10,862	0	0	10,862	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		3,621	3,621	3,621	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	565	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Emergency Shelter No. 1 - Demolish Building - ISO Shipping Container	3160-BLD-001	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	566	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Shelter No. 1 - Demolish and foundations - Timber Cribbing to Elevate Building	3160-BLD-001	15	m2	0.1	1.2	7.8	11.8	20.8	2	18	117	175	309	0	4	100%	0%	0%	100%	309	0	0	309	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		103	103	103	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	568	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Emergency Shelter No. 2 - Demolish Building - ISO Shipping Container	3160-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	569	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Shelter No. 2 - Demolish and foundations - Timber Cribbing to Elevate Building	3160-BLD-002	15	m2	0.1	1.2	7.8	11.8	20.8	2	18	117	175	309	0	4	100%	0%	0%	100%	309	0	0	309	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		103	103	103	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	571	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Emergency Shelter No. 3 - Demolish Building - ISO Shipping Container	3160-BLD-003	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	572	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Shelter No. 3 - Demolish and foundations - Timber Cribbing to Elevate Building	3160-BLD-003	15	m2	0.1	1.2	7.8	11.8	20.8	2	18	117	175	309	0	4	100%	0%	0%	100%	309	0	0	309	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		103	103	103	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	574	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Emergency Shelter No. 4 - Demolish Building - ISO Shipping Container	3160-BLD-004	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
3000	Tote Road	3100	General	3160	Emergency Shelters	3160	Emergency Shelters	575	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Shelter No. 4 - Demolish and foundations - Timber Cribbing to Elevate Building	3160-BLD-004	15	m2	0.1	1.2	7.8	11.8	20.8	2	18	117	175	309	0	4	100%	0%	0%	100%	309	0	0	309	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		103	103	103	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Ore Haul Truck		8	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	104	960	10,391	9,600	20,951	96	768	100%	0%	0%	100%	20,951	0	0	20,951	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		6,984	0	6,984	0	0	0	0	6,984
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		B-Train Trailer (for Ore Haul Truck)		8	Ea	10.0	45.0	999.1	450.0	1,494.1	80	360	7,993	3,600	11,953	24	192	100%	0%	0%	100%	11,953	0	0	11,953	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		3,984	0	3,984	0	0	0	0	3,984
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Mine Haul Truck, 777		3	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	39	360	3,897	3,600	7,857	96	288	100%	0%	0%	100%	7,857	0	0	7,857	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		2,619	0	2,619	0	0	0	0	2,619
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	3rd Party Heavy Mobile Equipment (make up for typical fleet)		3	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	39	360	3,897	3,600	7,857	96	288	100%	0%	0%	100%	7,857	0	0	7,857	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		2,619	0	2,619	0	0	0	0	2,619
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Mobile Light Plant		5	Ea	10.0	45.0	999.1	450.0	1,494.1	50	225	4,996	2,250	7,471	24	120	100%	0%	0%	100%	7,471	0	0	7,471	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		2,490	0	2,490	0	0	0	0	2,490
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Pick-Up Truck		7	Ea	6.7	25.0	666.1	250.0	941.1	47	175	4,663	1,750	6,588	4	28	100%	0%	0%	100%	6,588	0	0	6,588	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		2,196	0	2,196	0	0	0	0	2,196
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick Up	Pick Up Truck		6	Ea	6.7	25.0	666.1	250.0	941.1	40	150	3,997	1,500	5,647	4	24	100%	0%	0%	100%	5,647	0	0	5,647	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,882	0	1,882	0	0	0	0	1,882
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Excavator		2	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	26	240	2,598	2,400	5,238	96	192	100%	0%	0%	100%	5,238	0	0	5,238	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,746	0	1,746	0	0	0	0	1,746

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0-Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Large Forklift		2	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	26	240	2,598	2,400	5,238	96	192	100%	0%	0%	100%	5,238	0	0	5,238	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		1,746	0	1,746	0	0	0	0	1,746
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		PETERBILT SERVICE TRUCK 2014	HTP014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FREIGHTLINER VAC TRUCK	HTP018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FREIGHTLINER M2 SERVICE TRUCK	HTP022	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Grader		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777 Haul Truck		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		D10 Dozer		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Fuel/ Lube Truck		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Telehandler		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Zoom Boom		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		950H SNOW REMOVAL LOADER	LDR018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		DX800 SANDVIK ROCK DRILL	DRL001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		DX800 SANDVIK ROCK DRILL	DRL002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		DX780 SANDVIK ROCK DRILL	DRL005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		DX800 SANDVIK ROCK DRILL	DRL006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2013 K/W FUEL LUBE TRUCK	FLT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2014K/W FUEL LUBE TRUCK	FLT002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2014 MACK JET FUEL TRUCK	FLT003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		SUPER B FUEL TANKER LEAD UNIT	FLT004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TRI AXLE FUEL TRAILER	FLT006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		SUPER B FUEL TRAILER PUP UNIT	FLT007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B FUEL/LUBE TRUCK	FLT010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FREIGHTLINER M2 FUEL TRUCK	FLT011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING ROCK TRUCK	ART020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING WATER/SAND TRUCK	AWT001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		740B ARTICULATING WATER TRUCK	AWT002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		CONTAINER HANDLER	CNH001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TEREX RT780 CRANE	CRN002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TEREX RT130 CRANE	CRN003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MANITOWOC CRANE MODEL 2250	CRN004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0- Cost ($)	C&M Year 0+1- Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MOBILE SPYDER CRANE W706	CRN006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		BOOM CRANE, CONMA, MTP016	CRN008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TAMROCK RANDER 800-2 HYDRAULIC DRILL 200	DRL003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MD6290 CAT ROTARY PRODUCTION DRILL	DRL004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		MD6290 CAT ROTARY PRODUCTION DRILL	DRL007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		OSHKOSH FIRE TRUCK 1993 -T1500 MR	EMG002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		390DL EXCAVATOR CATERPILLAR	EXC001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		390DL EXCAVATOR CATERPILLAR	EXC002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		345DL EXCAVATOR CATERPILLAR	EXC003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		345DL EXCAVATOR CATERPILLAR	EXC005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		345DL EXCAVATOR CATERPILLAR	EXC006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		M320F EXCAVATOR CATERPILLAR RUBBER TIRE	EXC009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		16H CATERPILLAR GRADER	GRD001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		16M CATERPILLAR GRADER	GRD002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		14M CATERPILLAR GRADER	GRD003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		14M CATERPILLAR GRADER W/WING	GRD004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		14M CATERPILLAR GRADER	GRD005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		14M CATERPILLAR GRADER W/WING	GRD006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		992K WHEEL LOADER	LDR001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		988H WHEEL LOADER	LDR011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		930K WHEEL LOADER	LDR012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		930K WHEEL LOADER	LDR013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		930K WHEEL LOADER	LDR014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		930K WHEEL LOADER	LDR015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		IT14 LOADER NFLD HARDROCK	LDR019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		906 CATERPILLAR LOADER	LDR020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		VOLVO L-180 LOADER - W/TIRE MANIPULATOR	LDR021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINE HAUL TRUCK	MHT001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINE HAUL TRUCK	MHT002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINE HAUL TRUCK	MHT003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		777G MINE HAUL TRUCK	MHT004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT022	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT023	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT024	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT025	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT026	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT027	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT028	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT029	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT030	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT031	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT032	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT033	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT034	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT035	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT036	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT037	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT038	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR ORE HAUL TRUCK	OHT039	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1001	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1002	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1003	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1004	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1008	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1014	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1015	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1017	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1018	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1020	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1021	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1022	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1023	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1024	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1025	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1026	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1027	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1028
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1029
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1030
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1031

Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)
OHT1028	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619
OHT1029	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619
OHT1030	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619
OHT1031	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619

					C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Tag Number	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0- Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
OHT1028	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
OHT1029	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
OHT1030	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
OHT1031	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1032	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1033	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1034	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1035	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1036	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1037	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1038	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE HAUL LEAD TRAILER	OHT1039	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2006	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2008	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2009	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2010	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2011	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2012	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2013	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2014	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2015	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2016	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2017	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2018	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2019	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2020	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2021	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2022	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2023	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2024	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2025	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2026	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2027	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2028	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2029	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2030	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2031	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2032	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2033	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2034	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2035	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2036	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2037	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2038	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL PUP TRAILER	OHT2039	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Truck Wash Facility		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Container Handler		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Gantry Crane		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Single Pass Production Drill		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Ore Haul Truck Workshop		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		LOADER VOLVO-L-180E C/W TIRE HANDLER & 3 CRATES IN CAB		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SMITHCO SIDE DUMP TRAILER MODEL HDT 4-38-23, S/N 712377		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		HP 400RD PLANT CRUSHER S/N MC-0401/MC2015102		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment		C 125 JAW CRUSHER		1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		FORD F650 SERVICE TRUCK VIN# 3FDNF65H13MB00286		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		ORE TRAILER OFF-ROAD MINE MODEL HDT4-38-23 S/N 712379		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE SIDE DUMP TRAILER MODEL HDT4-38-23 S/N 712385	
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE SIDE-DUMP TRAILER MODEL HDT4-38-23, S/N 712381	
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK + 10 SPARE TIRES STRAPPED ON TRUCK	

Description	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)
ORE SIDE DUMP TRAILER MODEL HDT4-38-23 S/N 712385	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494
ORE SIDE-DUMP TRAILER MODEL HDT4-38-23, S/N 712381	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494
WESTERN STAR TRUCK + 10 SPARE TIRES STRAPPED ON TRUCK	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619

					C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Description	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
ORE SIDE DUMP TRAILER MODEL HDT4-38-23 S/N 712385	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
ORE SIDE-DUMP TRAILER MODEL HDT4-38-23, S/N 712381	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
WESTERN STAR TRUCK + 10 SPARE TIRES STRAPPED ON TRUCK	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712393		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712387		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712391		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712389		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712395		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK (2 PALLETS STRAPPED ON TRUCK)		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK (OHT031)		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2011 KENWORTH S/A MECHANICS SERVICE TRUCK VIN#		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL # 712397		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equip+H1825ment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712405		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712378		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL #712388		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2005 WESTERN STAR VIN# 1XKCPBEX85R980272		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2015 CAT 14M GRADER YELLOW VIN# 8814WKR9J88448		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2012 CAT 14M GRADER YELLOW		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WINCH TRUCK		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TRAILER DUMP TRUCK TRIAXLE S/N# 2ATE060336A003392		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712382		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712392		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712390		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712380		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712398		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL# 712394		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712384		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL #712402		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL #712400		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712396		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERAIL #712406 * damaged by		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WETSERN STAR TRUCK VIN: 5KJRASD19GPHD7171		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD14GPHD7174		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD12GPHD7173		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712404		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL #712386		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		2016 WESTERN STAR TRUCK VIN: 5KJRASD10GPHD7172		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		END DUMP TRAILER	EDT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HIBOY TRAILER	HBT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HIBOY TRAILER	HBT002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HIBOY TRAILER	HBT003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HIBOY TRAILER	HBT004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SCONA TRIDEM HI BOY TRAILER	HBT005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		Passenger Bus		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		Mechanics Truck (with compressor and crane)		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4110	Communication and IT	4110	Communication and IT	**579**	**BLD**	**FF4**	ISO Container	**FC**	**Buildings (Not Contaminated)**	**ISO Shipping Containers**		Communication Shed No. 1 - Demolish Building - ISO Shipping Container	4110-BLD-001	15	m2	**0.1**	**1.7**	**11.2**	**16.8**	29.7	**2**	**25**	**167**	**250**	442	**1**	**15**	**100%**	**0%**	**0%**	**100%**	442	0	0	442	Type A 2AM-MRY1325		2014	**Direct**			**33%**	**33%**	**33%**						0		147	147	147	0	0	0	0	0
4000	Mine Site	4100	General	4110	Communication and IT	4110	Communication and IT	582	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 2 - Demolish Building - ISO Shipping Container	4110-BLD-002	15	m2	0.1	1.7	11.2	16.8	29.7	2	25	167	250	442	1	15	100%	0%	0%	100%	442	0	0	442	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		147	147	147	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Construction Laydown Area		33,576	m2	0.0	0.1	1.3	0.4	1.8	426	4,910	42,608	13,314	60,832	0	0	100%	0%	0%	100%	60,832	0	0	60,832	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		20,277	20,277	20,277	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Existing Laydown Area		17,367	m2	0.0	0.1	1.3	0.4	1.8	220	2,540	22,038	6,887	31,465	0	0	100%	0%	0%	100%	31,465	0	0	31,465	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		10,488	10,488	10,488	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Additional laydown next to Hatch old office/carpentry shack		11,250	m2	0.0	0.1	1.3	0.4	1.8	143	1,645	14,276	4,461	20,366	0	0	100%	0%	0%	100%	20,366	0	0	20,366	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		6,789	6,789	6,789	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4133	Ore Crushing and Loading			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Crusher extension Pad		36,180	m2	0.01	0.1	1.3	0.4	1.8	459	5,291	45,912	14,347	65,496	0	0	100%	0%	0%	100%	65,496	0	0	65,496	Type A 2AM-MRY1325		2015 A	Direct			33%	33%	33%						0		21,832	21,832	21,832	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4133	Ore Crushing and Loading			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Crusher Pad Expansion		25,700	m2	0.01	0.1	1.3	0.4	1.8	326	3,759	32,613	10,191	46,525	0	0	100%	0%	0%	100%	46,525	0	0	46,525	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		15,508	15,508	15,508	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4136	Tote Road			A3	Grade & Re-Contour	A9	Site Works	Grade and Re-Contour Building		Grade and Re-Contour Building Footprints		223	m2	0.0	0.1	1.3	0.4	1.8	3	33	283	88	404	0	0	100%	0%	0%	100%	404	0	0	404	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		135	135	135	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry		258,580	m2	0.0	0.1	1.3	0.4	1.8	3,281	37,817	328,135	102,539	468,491	0	0	100%	0%	0%	100%	468,491	0	0	468,491	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		234,245	234,245	0	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry (additional marginal inrease in 2017)		6,000	m2	0.0	0.1	1.3	0.4	1.8	76	878	7,614	2,379	10,871	0	0	100%	0%	0%	100%	10,871	0	0	10,871	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		5,435	5,435	0	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	D1Q1 Quarry		66,978	m2	0.0	0.1	1.3	0.4	1.8	850	9,796	84,994	26,560	121,350	0	0	100%	0%	0%	100%	121,350	0	0	121,350	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		60,675	60,675	0	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	D1Q2 Quarry		109,807	m2	0.0	0.1	1.3	0.4	1.8	1,393	16,059	139,344	43,543	198,947	0	0	100%	0%	0%	100%	198,947	0	0	198,947	Type A 2AM-MRY1325	Check	2014	Direct			50%	50%							0		99,473	99,473	0	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Site Roads		80,899	m2	0.0	0.1	1.3	0.4	1.8	1,027	11,831	102,660	32,080	146,571	0	0	100%	0%	0%	100%	146,571	0	0	146,571	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		48,857	48,857	48,857	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Waste Rock Road		20,000	m2	0.0	0.1	1.3	0.4	1.8	254	2,925	25,380	7,931	36,236	0	0	100%	0%	0%	100%	36,236	0	0	36,236	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		12,079	12,079	12,079	0	0	0	0	0
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Site Roads		1,120	m2	0.0	0.1	1.3	0.4	1.8	14	164	1,421	444	2,028	0	0	100%	0%	0%	100%	2,028	0	0	2,028	Type A 2AM-MRY1325		2015 A	Direct			33%	33%	33%						0		676	676	676	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FLOAT TRAILER MINI DECK SCHELTENA MD1	LBT003-01	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		F750 DE-ICEING TRUCK BBS-97	MTP001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		24 PASSENGER BUS	BUS001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		48 PASSENGER BUS	BUS002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		24 PASSENGER BUS	BUS003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		48 PASSENGER BUS	BUS004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		48 PASSENGER BUS	BUS005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		MANUAL JIB CRANE MOBILE MAINTENANCE SHOP	CRN007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D6T CATERPILLAR DOZER	DZR005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		D9T CATERPILLAR DOZER	DZR006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		D9T CATERPILLAR DOZER	DZR007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D5M CATERPILLAR DOZER	DZR009	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		D4C CATERPILLAR DOZER LPGIII	DZR010	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		824H CATERPILLAR RUBBER TIRED DOZER	DZR011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		D9T CATERPILLAR DOZER	DZR012	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRACTOR	FLT005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TRI AXLE WATER TRUCK	HTP004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		PETERBILT ROAD MAINTENANCE 2013	HTP005	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		STERLING BOOM TRUCK W/ MANITEX CRANE	HTP006	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		STERLING BOOM TRUCK W/ MANITEX CRANE	HTP007	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		PETERBILT 367 TRACTOR 2017	HTP009	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		KENWORTH TOW TRUCK	HTP010	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		PETERBILT TRACTOR 2014	HTP011	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		PETERBILT TRACTOR 2014	HTP013	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PETERBILT ROLL OFF TRUCK	HTP015	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		INTERNATIONAL PLOW TRUCK	HTP016	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		INTERNATIONAL BOOM TRUCK KNUCKLE	HTP019	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR 4900 2014 (NFLD HARD ROCK)	HTP024	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR 4900 2014 (NFLD HARD ROCK)	HTP025	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRACTOR	HTP029	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRACTOR	HTP032	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		WESTERN STAR TRACTOR	HTP033	1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		JLG MAN LIFT	JLG007	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		GENIE BOOM LIFT ZOOM BOOM Z60/34	JLG008	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		KUBOTA TRACTOR B7800	KUB004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		LOWBOY TRAILER DELOUPE	LBT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		LOWBOY TRAILER DELOUPE	LBT002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		CS74 SMOOTH ROLLER	RLR002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TH514	TLH002	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TH514	TLH003	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TH514	TLH004	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TELEHANDLER CAT TL642	TLH005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		TRAILER LIVE BOTTOM	WBT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		PC09-1 EXCAVATOR KOMATSU MINI	EXC008	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Boom Truck		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Passenger Bus		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Track Dozer, D9		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Shovel 6030		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Integrated Tool Carrier, 938		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	FREIGHT HAUL TRACTOR ,		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	WATER TRUCK		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	MAINTENANCE FUEL/LUBE TRUCK ,		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		53' POWER TRAILER		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		F550 FLAT DECK PICK-UP WHITE VIN# 1FDOW5HTOFED33588		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		STEP-DECK TRAILER 3 AXLES UNIT # 533F650		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		TRACTOR FRTL CABOVER UNIT 512109		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		GMC PICK UP 4WD + TOOL/JOB BOX VIN# 1GTHK39D17E173219		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		UTILITY TRAILERS STACKED 2 HIGH		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		ORE HAUL TRAILER (FRONT) SERIAL # 712383		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712399		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITHCO SIDE-DUMP TRAILER, SERIAL # 712401		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2015 SMITH SIDE-DUMP TRAILER, SERIAL # 712403		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2007 FREIGHTLINER M2 4X4 VIN# 1FVDCXDC47HX81790		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		SANDVIK QA441 SCREENER S/N # QA44100342		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment		SANDVIK NEW QJ341 JAW CRUSHER S/N# QJ34100262		1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		BRODERSON 16 80 CRANE		1	Ea	13.0	120.0	1,298.9	1,200.0	2,618.9	13	120	1,299	1,200	2,619	96	96	100%	0%	0%	100%	2,619	0	0	2,619	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		873	0	873	0	0	0	0	873
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		V SNOW PLOW VIN# 9900-2564		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		2006 TRAILER TRIAXLE GREY VIN# LA90735316A003393 * RECEIVED WITH		1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT012	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT013	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT014	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT015	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT016	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT017	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT018	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT019	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT020	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT021	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT022	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT023	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	Year 0+1 - %	Closure Year 1 - %	Year 2 - %	Year 3 - %	Post Closure Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	C&M Year 0 - Cost ($)	Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT024	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT025	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT026	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT027	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT028	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT029	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TEREX LIGHT TOWER	ALT030	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT035	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT036	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT037	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT038	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT040	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		INGERSOLL RAND LIGHT TOWER	ALT041	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 AMBULANCE	EMG003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F450 AMBULANCE	EMG004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		HAGGLUNDS SNOW RESCUE VEHICLE	EMG007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FORKLIFT CATERPILLAR P20000	FKT001	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		FORKLIFT CATERPILLAR P10000	FKT005	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FORKLIFT/MANLIFT CROWN WAV50-118	FKT010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLAMELESS SPARKLESS HEATER	FSH003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLAMELESS SPARKLESS HEATER	FSH004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GROUND SURFACE HEATER	GTH001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GENIE MANLIFT / Z45/25J (BURNED)	JLG004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GENIE MANLIFT / Z45/25J	JLG005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		JLG MANLIFT 450AJ	JLG010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		FLOAT TRAILER SCHELTENA	LBT003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2013	LTP004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP011	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP013	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP014	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP016	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP017	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP020	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP021	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP024	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP025	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP027	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP029	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2008	LTP030	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TOYOTA 4X4 PICK-UP LAND CRUISER	LTP031	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2008	LTP033	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TOYOTA 4X4 PICK UP LAND CRUISER	LTP034	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2011	LTP038	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2013	LTP040	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2013	LTP043	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP044	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP045	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP046	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP047	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP056	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP057	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F250 SD CREW CAB 4X4 2014	LTP058	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP059	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 SD CREW CAB 4X4 2014	LTP060	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F350 CREW CAB 4X4 2010- LEVITT SAFETY	LTP063	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		3500 GMC CREW CAB 4X4 2006	LTP067	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		GMC 2500 MOBILE STAIR TRUCK	MST001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 DECK TRUCK	MTP002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 DECK TRUCK	MTP004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 WELDING TRUCK	MTP005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013	MTP007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 CUBE VAN	MTP008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013 (BLASTERS)	MTP009	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2013	MTP010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		F550 SERVICE TRUCK FOUNTAIN TIRE	MTP011	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2014	MTP012	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		F550 SERVICE TRUCK	MTP013	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		F550 SD CREW CAB 4X4 2015	MTP014	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		F650 SERVICE TRUCK 2003	MTP015	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498

Baffinland

Mary River Project - Complete Project Security Assessment - Estimate Breakdown Structure
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M: Year 0 - %	C&M: Year 0+1 - %	Closure: Year 1 - %	Closure: Year 2 - %	Closure: Year 3 - %	Post Closure: Year 4 - %	Post Closure: Year 5 - %	Post Closure: Year 6 - %	Post Closure: Year 7 - %	Post Closure: Year 8 - %	C&M: Year 0 - Cost ($)	C&M: Year 0+1 - Cost ($)	Closure: Year 1 - Cost ($)	Closure: Year 2 - Cost ($)	Closure: Year 3 - Cost ($)	Post Closure: Year 4 - Cost ($)	Post Closure: Year 5 - Cost ($)	Post Closure: Year 6 - Cost ($)	Post Closure: Year 7 - Cost ($)	Post Closure: Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment		F-550 SERVICE TRUCK FOUNTAIN TIRE	MTP016	1	Ea	10.0	45.0	999.1	450.0	1,494.1	10	45	999	450	1,494	24	24	100%	0%	0%	100%	1,494	0	0	1,494	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		498	0	498	0	0	0	0	498
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PULL- TYPE PNEUMATIC ROLLER	PTR001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PULL-TYPE PNEUMATIC TIRE ROLLER	PTR002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE VAC TANK UNIT	PVT001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE VACUUM TANK c/w PUMP	PVT002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE VAC TANK UNIT	PVT003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP 6"	PWP001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP	PWP002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP 4"	PWP003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		PORTABLE WATR PUMP - CAT-PAC	PWP004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 277 MULTI TERRAIN	SKD005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 299D	SKD008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 247B	SKD010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKID STEER CATERPILLAR 262D Rubber Tire	SKD012	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 03	SKJ003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SCISSOR LIFT 10	SKJ010	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TUNDRA SKIDOO	SNM003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKANDIK WT 600	SNM004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKANDIK WT 600	SNM005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKANDIC ACE 600 SNOWMOBILE	SNM006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SKANDIC ACE 600 SNOWMOBILE	SNM007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE CAN AM COMMANDER 800XT	SXS001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT	SXS007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SIDE BY SIDE BOBCAT TRACKED	SXS008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TIRE MANIPULATOR	TMN001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		TRAILER ENCLOSED SNOWMOBILE	TRL001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		BOAT TRAILER	TRL002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER MILLER AIR PAK	WLD001	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER MILLER AIR PAK	WLD002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD004	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD007	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		WELDER LINCOLN 300D	WLD008	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		STERLING SPILL RESPONSE UNIT 2002	EMG005	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		STERLING SPILL RESPONSE UNIT 2002	EMG006	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		CARGO LUGGAGE HANDLER	CNH003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SNOW BLOWER VOHL DV4000	SBL002	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment		SNOW BLOWER VOHL DV4000	SBL003	1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Flat Deck Truck		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Mini-Crane		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	RESCUE UNIT		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	MECHANICS TRUCK,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	SKELETON TRAILER,		1	Ea	6.7	25.0	666.1	250.0	941.1	7	25	666	250	941	4	4	100%	0%	0%	100%	941	0	0	941	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		314	0	314	0	0	0	0	314
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		1650 GAL. VERTICAL STORAGE TANK		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		1650 GAL. VERTICAL STORAGE TANK		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment		TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		1650 GAL. VERTICAL STORAGE TANK + BOX PLASTIC FITTINGS		1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		716	0	716	0	0	0	0	716
4000	Mine Site	4200	Mine	4210	Explosives Facility	4211	Explosives Plant Building	769	BLD	FF1-c	Modular Building Contaminated (480	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Explosives Plant Building - Demolish and Decontaminate Building - Trailer - Modular	4211-BLD-001	342	m2	0.6	3.4	56.0	84.1	143.4	192	1,150	19,150	28,750	49,050	1	342	100%	0%	0%	100%	49,050	0	0	49,050	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		16,350	16,350	16,350	0	0	0	0	0
4000	Mine Site	4200	Mine	4210	Explosives Facility	4212	Explosives Shop	773	BLD	FF2-c	Fold Away Building Contaminated (480	FFL-c	Buildings (Contaminated)	Fold Away Building		Explosives Shop - Demolish and Decontaminate Building - Fold-away	4212-BLD-001	372	m2	0.6	2.4	56.0	84.1	142.4	208	875	20,815	31,250	52,940	1	372	100%	0%	0%	100%	52,940	0	0	52,940	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		17,647	17,647	17,647	0	0	0	0	0
4000	Mine Site	4200	Mine	4210	Explosives Facility	4212	Explosives Shop	775	BLD	CS	Slab on Grade - ASSUME 300mm	CS	Flooring / Foundations	Slab on Grade		Explosives Shop - Demolish floor finish - Slab on grade C/W Drainage	4212-BLD-001	372	m2	0.1	1.9	12.5	18.8	33.1	46	697	4,643	6,970	12,310	0	0	100%	0%	0%	100%	12,310	0	0	12,310	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		4,103	4,103	4,103	0	0	0	0	0
4000	Mine Site	4200	Mine	4210	Explosives Facility	4213	Explosives Magazines	777	BLD	FF1-c	Modular Building Contaminated (480	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Explosives Magazines - Demolish and Decontaminate Building - Trailer - Single	4213-BLD-001	33	m2	0.6	3.4	56.0	84.1	143.4	19	113	1,873	2,813	4,798	1	33	100%	0%	0%	100%	4,798	0	0	4,798	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,599	1,599	1,599	0	0	0	0	0
4000	Mine Site	4200	Mine	4220	Explosives Facility	4222	Explosive pad haul road			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Explosive pad haul road		19,600	m2	0.0	0.1	1.3	0.4	1.8	249	2,867	24,872	7,772	35,511	0	0	100%	0%	0%	100%	35,511	0	0	35,511	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		11,837	11,837	11,837	0	0	0	0	0
4000	Mine Site	4200	Mine	4230	Waste Rock Dump	4230	Waste Rock Dump			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Waste Rock Dump		190,000	m2	0.0	0.1	1.3	0.4	1.8	2,411	27,788	241,108	75,344	190,000	0	0	100%	0%	0%	100%	190,000	0	0	190,000	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		63,333	63,333	63,333	0	0	0	0	0
4000	Mine Site	4200	Mine	4230	Waste Rock Pond	4230	Waste Rock Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With	Grade and Contour	Waste Rock Pond		6,000	m2	0.0	0.2	4.4	0.7	5.3	267	1,068	26,694	4,287	32,050	0	0	100%	0%	0%	100%	32,050	0	0	32,050	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		10,683	10,683	10,683	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Pit 1		55,000	m2	0.0	0.1	1.3	0.4	1.8	698	8,044	69,794	21,810	99,648	0	0	100%	0%	0%	100%	99,648	0	0	99,648	Type A 2AM-MRY1325		2015	Direct			50%	50%							0		49,824	49,824	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Pit 1 - Marginal increase		214,450	m2	0.0	0.1	1.3	0.4	1.8	2,721	31,363	272,134	85,039	388,218	0	0	100%	0%	0%	100%	388,218	0	0	388,218	Type A 2AM-MRY1325	Added	2015 R	Direct			50%	50%							0		194,109	194,109	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With		PWSP	PWSP-1	3,720	m2	0.0	0.2	4.4	0.7	5.3	166	662	16,550	2,658	19,747	0	0	100%	0%	0%	100%	19,747	0	0	19,747	Type A 2AM-MRY1325	Modified	2015 R	Direct				100%							0		0	19,747	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With		PWSP	PWSP-2	6,967	m2	0.0	0.2	4.4	0.7	5.3	310	1,240	30,996	4,978	36,983	0	0	100%	0%	0%	100%	36,983	0	0	36,983	Type A 2AM-MRY1325	Modified	2015 R	Direct				100%							0		0	36,983	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4250	Open Pit Development	4250	Open Pit Development			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With		PWSP	PWSP-3	6,511	m2	0.0	0.2	4.4	0.7	5.3	290	1,159	28,967	4,652	34,562	0	0	100%	0%	0%	100%	34,562	0	0	34,562	Type A 2AM-MRY1325	Modified	2015 R	Direct				100%							0		0	34,562	0	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	786	BLD	FF1	Modular Building Not Contaminated	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Pit Office Building - Demolish and Decontaminate Building - Trailer - Modular	4281-BLD-001	268	m2	0.2	3.4	22.4	33.6	59.4	60	900	5,995	9,000	15,895	1	268	100%	0%	0%	100%	15,895	0	0	15,895	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,298	5,298	5,298	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	787	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Pit Office Building - Demolish and foundations - Timber Cribbing to Elevate	4281-BLD-001	268	m2	0.1	1.2	7.8	11.8	20.8	33	315	2,098	3,150	5,563	0	80	100%	0%	0%	100%	5,563	0	0	5,563	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,854	1,854	1,854	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	789	BLD	FF1	Modular Building Not Contaminated	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Pit Office Washcar - Demolish and Decontaminate Building - Trailer - Single	4281-BLD-002	45	m2	0.2	3.4	22.4	33.6	59.4	10	150	999	1,500	2,649	1	45	100%	0%	0%	100%	2,649	0	0	2,649	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		883	883	883	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	009	BLD	FF1	Modular Building Not Contaminated	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Geology 'core' building - Demolish and Decontaminate Building - Trailer - Single	4000-BLD-GEO-001	72	m2	0.2	3.4	22.4	33.6	59.4	16	242	1,613	2,421	4,276	1	72	100%	0%	0%	100%	4,276	0	0	4,276	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		1,425	1,425	1,425	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	009	BLD	FF1	Modular Building Not Contaminated	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Geology 'core' building - Demolish and Decontaminate Building - Trailer - Single	4000-BLD-GEO-002	54	m2	0.2	3.4	22.4	33.6	59.4	12	182	1,209	1,816	3,207	1	54	100%	0%	0%	100%	3,207	0	0	3,207	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		1,069	1,069	1,069	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	009	BLD	FF1	Modular Building Not Contaminated	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Geology 'core' building - Demolish and Decontaminate Building - Trailer - Single	4000-BLD-GEO-003	36	m2	0.2	3.4	22.4	33.6	59.4	8	121	806	1,211	2,138	1	36	100%	0%	0%	100%	2,138	0	0	2,138	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		713	713	713	0	0	0	0	0
4000	Mine Site	4200	Mine	4280	Mine Support Facilities	4281	Pit Office Building	009	BLD	FF1	Modular Building Not Contaminated	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Geology 'core' building - Demolish and Decontaminate Building - Trailer - Single	4000-BLD-GEO-004	25	m2	0.2	3.4	22.4	33.6	59.4	6	84	560	841	1,485	1	25	100%	0%	0%	100%	1,485	0	0	1,485	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		495	495	495	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		BAE	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread A, Primary Jaw Plant	Spread A, Primary Jaw Plant	MR-PRO-CRU-010-PJP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		BAE	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread B, Primary Jaw Plant	Spread B, Primary Jaw Plant	MR-PRO-CRU-020-PJP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		BAE	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread C, Primary Jaw Plant	Spread C, Primary Jaw Plant	MR-PRO-CRU-030-PJP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Chain Conveyor	Chain Conveyor (1 for under jaw crusher, 1 for under crusher bin)		2	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	38	426	3,837	4,260	8,523	1	2	100%	0%	0%	100%	8,523	0	0	8,523	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		2,841	0	2,841	0	0	0	0	2,841
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		AIM	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Control Room	Spread A, Control Room	MR-PRO-CRU-010-COR01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Fine Discharge	Spread A, Fine Discharge	MR-PRO-CRU-010-FID01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread A, Lumps Discharge	Spread A, Lumps Discharge	MR-PRO-CRU-010-LUD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread A, Secondary Cone	Spread A, Secondary Cone Feed	MR-PRO-CRU-010-PCF01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread A, Primary Screen Plant	Spread A, Primary Screen Plant Discharge	MR-PRO-CRU-010-PSD01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread A, Primary Screen Plant	Spread A, Primary Screen Plant	MR-PRO-CRU-010-PSP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread A, Secondary Cone Plant	Spread A, Secondary Cone Plant	MR-PRO-CRU-010-SCP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread A, Tertiary Cone Plant	Spread A, Tertiary Cone Plant	MR-PRO-CRU-010-TCP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread A, Twin Screen Plant	Spread A, Twin Screen Plant	MR-PRO-CRU-010-TSP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		AIM	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Control Room	Spread B, Control Room	MR-PRO-CRU-020-COR01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Fine Discharge	Spread B, Fine Discharge	MR-PRO-CRU-020-FID01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Lumps Discharge	Spread B, Lumps Discharge	MR-PRO-CRU-020-LUD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread B, Secondary Cone	Spread B, Secondary Cone Feed	MR-PRO-CRU-020-PCF01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread B, Primary Screen Plant	Spread B, Primary Screen Plant Discharge	MR-PRO-CRU-020-PSD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread B, Primary Screen Plant	Spread B, Primary Screen Plant	MR-PRO-CRU-020-PSP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread B, Secondary Cone Plant	Spread B, Secondary Cone Plant	MR-PRO-CRU-020-SCP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread B, Tertiary Cone Plant	Spread B, Tertiary Cone Plant	MR-PRO-CRU-020-TCP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread B, Twin Screen Plant	Spread B, Twin Screen Plant	MR-PRO-CRU-020-TSP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Fine Discharge	Spread C, Fine Discharge	MR-PRO-CRU-030-FID01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Spread C, Lumps Discharge	Spread C, Lumps Discharge	MR-PRO-CRU-030-LUD01	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread C, Secondary Cone Feed	Spread C, Secondary Cone Feed	MR-PRO-CRU-030-PCF01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread C, Primary Screen Plant	Spread C, Primary Screen Plant Discharge	MR-PRO-CRU-030-PSD01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread C, Primary Screen Plant	Spread C, Primary Screen Plant	MR-PRO-CRU-030-PSP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread C, Secondary Cone Plant	Spread C, Secondary Cone Plant	MR-PRO-CRU-030-SCP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		ADR	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread C, Tertiary Cone Plant	Spread C, Tertiary Cone Plant	MR-PRO-CRU-030-TCP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System		COB	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Spread C, Twin Screen Plant	Spread C, Twin Screen Plant	MR-PRO-CRU-030-TSP01	1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2015 R	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Ore Stockpiles		5,100	m2	0.0	0.1	1.3	0.4	1.8	65	746	6,472	2,022	9,241	0	0	100%	0%	0%	100%	9,241	0	0	9,241	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,080	3,080	3,080	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Ore crushing and Loading Pad, Utility & Accomodation Pads		121,021	m2	0.0	0.1	1.3	0.4	1.8	1,536	17,699	153,574	47,990	219,264	0	0	100%	0%	0%	100%	219,264	0	0	219,264	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		73,088	73,088	73,088	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System	795	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Crushing & Screening Electrical Trailer - Demolish and Decontaminate Building - Special Modular / Prefabricated	4381-BLD-001	39	m2	0.6	3.4	56.0	84.1	143.4	22	133	2,206	3,313	5,651	1	39	100%	0%	0%	100%	5,651	0	0	5,651	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,884	1,884	1,884	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4381	Crushing and Screening System	798	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Crushing & Screening Electrical Trailer - Demolish and Decontaminate Building - Special Modular / Prefabricated	4381-BLD-002	39	m2	0.6	3.4	56.0	84.1	143.4	22	133	2,206	3,313	5,651	1	39	100%	0%	0%	100%	5,651	0	0	5,651	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,884	1,884	1,884	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4382	Truck Weigh Facility			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Truck Weigh Facility disturbed area		13,000	m2	0.0	0.1	1.3	0.4	1.8	165	1,901	16,497	5,155	23,553	0	0	100%	0%	0%	100%	23,553	0	0	23,553	Type A 2AM-MRY1325	Check	2015	Direct			100%								0		23,553	0	0	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4382	Truck Weigh Facility	820	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Truck Weigh Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4382-BLD-001	335	m2	0.6	2.4	56.0	84.1	142.4	188	788	18,734	28,125	47,646	1	335	100%	0%	0%	100%	47,646	0	0	47,646	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		15,882	15,882	15,882	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4382	Truck Weigh Facility	821	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Truck Weigh Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4382-BLD-001	335	m2	0.1	2.2	14.5	21.8	38.5	49	729	4,854	7,287	12,870	1	251	100%	0%	0%	100%	12,870	0	0	12,870	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		4,290	4,290	4,290	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4385	Crushing Stockpile Settling Pond	828	In Meters	piping	Piping	Piping	Bulks	Piping		Stockpile Drain Pipe - Piping Installation - Ore stockpile to effluent pond and Mary River	4385.1-P	5,220	m	0.3	3.8	25.0	37.5	66.2	1,305	19,575	130,387	195,750	345,712	0	52	100%	0%	100%	0%	345,712	0	345,712	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		115,237	115,237	115,237	0	0	0	0	0
4000	Mine Site	4300	Material Handling	4380	Crushing and Screening	4385	Crushing Stockpile Settling Pond			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Ore Crushing Sedimentation Pond		6,429	m2	0.0	0.2	4.4	0.7	5.3	286	1,145	28,601	4,594	34,339	0	0	100%	0%	0%	100%	34,339	0	0	34,339	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		11,446	11,446	11,446	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4430	Aerodrome Facilities			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Heli Pad		5,776	m2	0.0	0.1	1.3	0.4	1.8	73	845	7,330	2,290	10,465	0	0	100%	0%	0%	100%	10,465	0	0	10,465	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,488	3,488	3,488	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4431	Aerodrome Office	833	BLD	FF1	Modular Building Not Contaminated	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Aerodrome Office - Demolish and Decontaminate Building - Trailer - Single	4431-BLD-001	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4431	Aerodrome Office	834	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Aerodrome Office - Demolish and foundations - Timber Cribbing to Elevate	4431-BLD-001	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4431	Aerodrome Office	838	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - AERODROME OFFICE RAW WATER TANK - NORWESCO L: 1613 W: 737 H: 1676	4431-TK-001	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4431	Aerodrome Office	839	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - AERODROME OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791	4431-TK-004	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
4000	Mine Site	4400	Aerodrome	4430	Aerodrome Facilities	4435	Field Electrical Centre	850	BLD	FF1-c	Modular Building Contaminated (480	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Aerodrome Field Electrical Centre - Demolish and Decontaminate Building -	4435-BLD-001	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		711	711	711	0	0	0	0	0
4000	Mine Site	4400	Non Process Facilities	4430	Aerodrome Facilities	4432	Equipment Building		BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Aerodrome Equipment Building - Demolish and Decontaminate Building - Undefined	4521-BLD-003	1,296	m2	0.6	2.4	56.0	84.1	142.4	726	3,050	72,567	108,945	184,563	1	1,296	100%	0%	0%	100%	184,563	0	0	184,563	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		61,521	61,521	61,521	0	0	0	0	0
4000	Mine Site	4400	Non Process Facilities	4430	Aerodrome Facilities	4432	Equipment Building		BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Aerodrome Equipment Building - Demolish and foundations - Undefined	4521-BLD-003	1,296	m2	0.1	2.2	14.5	21.8	38.5	188	2,823	18,802	28,228	49,853	1	972	100%	0%	0%	100%	49,853	0	0	49,853	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		16,618	16,618	16,618	0	0	0	0	0
4000	Mine Site	4400	Non Process Facilities	4430	Aerodrome Facilities	4432	Equipment Building		BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Aerodrome Equipment Building - Demolish floor finish - Undefined	4521-BLD-003	1,296	m2	0.1	1.9	12.5	18.8	33.1	162	2,430	16,186	24,300	42,916	0	0	100%	0%	0%	100%	42,916	0	0	42,916	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		14,305	14,305	14,305	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment		FRF	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Heater	Frost Fighter Heater	MR-FAC-POH-010	52	Ea	8.1	106.5	809.3	1,065.0	1,980.8	421	5,538	42,084	55,380	103,002	1	26	100%	0%	0%	100%	103,002	0	0	103,002	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		34,334	0	34,334	0	0	0	0	34,334
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment	1015	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Bench grinder	Light Plant		10	Ea	8.1	106.5	809.3	1,065.0	1,980.8	81	1,065	8,093	10,650	19,808	1	5	100%	0%	0%	100%	19,808	0	0	19,808	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		6,603	0	6,603	0	0	0	0	6,603
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment	1015	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Bench grinder	Frost Fighter Heater		10	Ea	8.1	106.5	809.3	1,065.0	1,980.8	81	1,065	8,093	10,650	19,808	1	5	100%	0%	0%	100%	19,808	0	0	19,808	Type A 2AM-MRY1325	Added	2017	Direct			33%		33%					33%	0		6,603	0	6,603	0	0	0	0	6,603
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment		HOB	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Hot Box	Hot Box Heater	MR-FAC-POH-020	4	Ea	8.1	106.5	809.3	1,065.0	1,980.8	32	426	3,237	4,260	7,923	1	2	100%	0%	0%	100%	7,923	0	0	7,923	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		2,641	0	2,641	0	0	0	0	2,641
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1038	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - TRUCK WASH BUILDING DIESEL TANK	4523-TK-004	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2014	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1038		MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment		Additional Truck Wash Building - Truck Wash System		1	Ea	168.0	2,220.0	16,785.4	22,200.0	41,205.4	168	2,220	16,785	22,200	41,205	56	56	100%	0%	0%	100%	41,205	0	0	41,205	Type A 2AM-MRY1325	Modified (2017A)	2017	Direct			33%		33%					33%	0		13,735	0	13,735	0	0	0	0	13,735
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1082	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - MILNE WASTE MANAGEMENT BUILDING DIESEL FUEL TANK - DTE ULC601-07	4540-TK-007	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2014	Direct			50%	50%							0		2,131	2,131	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	859	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Service Core - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-001	1,857	m2	0.2	3.4	22.4	33.6	59.4	416	6,244	41,589	62,438	110,270	1	1,857	100%	0%	0%	100%	110,270	0	0	110,270	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		36,757	36,757	36,757	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	862	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Office - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-002	608	m2	0.2	3.4	22.4	33.6	59.4	136	2,044	13,613	20,438	36,094	1	608	100%	0%	0%	100%	36,094	0	0	36,094	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,031	12,031	12,031	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	865	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Laundry - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-003	424	m2	0.2	3.4	22.4	33.6	59.4	95	1,425	9,492	14,250	25,167	1	424	100%	0%	0%	100%	25,167	0	0	25,167	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		8,389	8,389	8,389	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	868	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Laboratory - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-004	312	m2	0.2	3.4	22.4	33.6	59.4	70	1,050	6,994	10,500	18,544	1	312	100%	0%	0%	100%	18,544	0	0	18,544	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		6,181	6,181	6,181	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	899	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AA - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-001	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	902	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AB - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-002	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	905	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AC - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-003	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	908	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AD - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-004	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	911	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AE - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-005	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	914	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AF - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-006	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings	917	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Wing AG - Demolish and Decontaminate Building - Special Modular / Prefabricated	4512-BLD-007	612	m2	0.2	3.4	22.4	33.6	59.4	137	2,057	13,703	20,572	36,332	1	612	100%	0%	0%	100%	36,332	0	0	36,332	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,111	12,111	12,111	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	921	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Emergency Response Office - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4513-BLD-001	89	m2	0.2	3.4	22.4	33.6	59.4	20	300	1,998	3,000	5,298	1	89	100%	0%	0%	100%	5,298	0	0	5,298	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,766	1,766	1,766	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	922	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Response Office - Demolish and foundations - Timber Cribbing to Elevate Building	4513-BLD-001	89	m2	0.1	1.2	7.8	11.8	20.8	11	105	699	1,050	1,854	0	27	100%	0%	0%	100%	1,854	0	0	1,854	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		618	618	618	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	924	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Emergency Response Garage - Demolish and Decontaminate Building - Fold-away Building (Steel)	4513-BLD-002	279	m2	0.2	2.4	15.7	23.5	41.6	44	656	4,371	6,563	11,590	1	279	100%	0%	0%	100%	11,590	0	0	11,590	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,863	3,863	3,863	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	925	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Emergency Response Garage - Demolish and foundations - Precast Footing (Perimeter Beam)	4513-BLD-002	279	m2	0.1	2.2	14.5	21.8	38.5	40	607	4,045	6,073	10,725	1	209	100%	0%	0%	100%	10,725	0	0	10,725	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,575	3,575	3,575	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	926	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Emergency Response Garage - Demolish floor finish - Slab on grade C/W Drainage	4513-BLD-002	279	m2	0.1	1.9	12.5	18.8	33.1	35	523	3,482	5,228	9,233	0	0	100%	0%	0%	100%	9,233	0	0	9,233	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,078	3,078	3,078	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	937	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - EMERGENCY RESPONSE OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	4513-TK-004	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	938	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - EMERGENCY RESPONSE OFFICE RAW WATER TANK - NORWESCO L: 1613 W: 737 H: 1676	4513-TK-005	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	939	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MINE EMERGENCY RESPONSE GARAGE DIESEL FUEL TANK - DTE ULC601-07	4513-TK-023	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	942	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Maintenance Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4521-BLD-001	2,416	m2	0.6	2.4	56.0	84.1	142.4	1,354	5,688	135,299	203,125	344,112	1	2,416	100%	0%	0%	100%	344,112	0	0	344,112	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		114,704	114,704	114,704	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	943	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Maintenance Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4521-BLD-001	2,416	m2	0.1	2.2	14.5	21.8	38.5	351	5,263	35,057	52,631	92,950	1	1,812	100%	0%	0%	100%	92,950	0	0	92,950	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		30,983	30,983	30,983	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	944	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Maintenance Building - Demolish floor finish - Slab on grade C/W Drainage	4521-BLD-001	2,416	m2	0.1	1.9	12.5	18.8	33.1	302	4,531	30,178	45,307	80,016	0	0	100%	0%	0%	100%	80,016	0	0	80,016	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		26,672	26,672	26,672	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	945	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Warehouse - Demolish and Decontaminate Building - Fold-away Building (Steel)	4521-BLD-002	892	m2	0.6	2.4	56.0	84.1	142.4	500	2,100	49,957	75,000	127,057	1	892	100%	0%	0%	100%	127,057	0	0	127,057	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		42,352	42,352	42,352	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	946	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Warehouse - Demolish and foundations - Precast Footing (Perimeter Beam)	4521-BLD-002	892	m2	0.1	2.2	14.5	21.8	38.5	130	1,943	12,944	19,433	34,320	1	669	100%	0%	0%	100%	34,320	0	0	34,320	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		11,440	11,440	11,440	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	947	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Warehouse - Demolish floor finish - Slab on grade C/W Drainage	4521-BLD-002	892	m2	0.1	1.9	12.5	18.8	33.1	112	1,673	11,143	16,729	29,544	0	0	100%	0%	0%	100%	29,544	0	0	29,544	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		9,848	9,848	9,848	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	948	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Welding Shop Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4521-BLD-003	390	m2	0.6	2.4	56.0	84.1	142.4	219	919	21,856	32,813	55,587	1	390	100%	0%	0%	100%	55,587	0	0	55,587	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		18,529	18,529	18,529	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	949	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Welding Shop Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4521-BLD-003	390	m2	0.1	2.2	14.5	21.8	38.5	57	850	5,663	8,502	15,015	1	293	100%	0%	0%	100%	15,015	0	0	15,015	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,005	5,005	5,005	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	950	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Welding Shop Building - Demolish floor finish - Slab on grade C/W Drainage	4521-BLD-003	390	m2	0.1	1.9	12.5	18.8	33.1	49	732	4,875	7,319	12,926	0	0	100%	0%	0%	100%	12,926	0	0	12,926	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		4,309	4,309	4,309	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	951	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Workshop Office Building - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4521-BLD-004	268	m2	0.6	3.4	56.0	84.1	143.4	150	900	14,987	22,500	38,387	1	268	100%	0%	0%	100%	38,387	0	0	38,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,796	12,796	12,796	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	952	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Workshop Office Building - Demolish and foundations - Timber Cribbing to Elevate Building	4521-BLD-004	268	m2	0.1	1.2	7.8	11.8	20.8	33	315	2,098	3,150	5,563	0	80	100%	0%	0%	100%	5,563	0	0	5,563	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,854	1,854	1,854	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	954	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Workshop Office Washcar - Demolish and Decontaminate Building - Trailer - Single	4521-BLD-005	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	955	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Workshop Office Washcar - Demolish and foundations - Timber Cribbing to Elevate Building	4521-BLD-005	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	971	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - WELDING SHOP DIESEL FUEL TANK - DTE ULC601-07	4521-TK-005	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	972	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MAINTENANCE BUILDING DIESEL TANK	4521-TK-013	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	973	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - WAREHOUSE BUILDING DIESEL TANK	4521-TK-023	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	974	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - WORKSHOP OFFICE WASHCAR RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	4521-TK-050	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	975	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - WORKSHOP OFFICE WASHCAR SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	4521-TK-053	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4521	Services Buildings	976	In Meters	piping	Piping	Piping	Bulks	Piping		Maintenance Building Utility Piping - Piping Installation - Water, air and lube piping inside building	4521.5-P	405	m	0.3	3.8	25.0	37.5	66.2	101	1,519	10,116	15,188	26,822	0	4	100%	0%	100%	0%	26,822	0	26,822	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		8,941	8,941	8,941	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1031	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Truck Wash Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4523-BLD-001	1,004	m2	0.6	2.4	56.0	84.1	142.4	563	2,363	56,201	84,375	142,939	1	1,004	100%	0%	0%	100%	142,939	0	0	142,939	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		47,646	47,646	47,646	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1032	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Truck Wash Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4523-BLD-001	1,004	m2	0.1	2.2	14.5	21.8	38.5	146	2,186	14,562	21,862	38,610	1	753	100%	0%	0%	100%	38,610	0	0	38,610	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		12,870	12,870	12,870	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1031	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Additonal Truck Wash Building		1,500	m2	0.6	2.4	56.0	84.1	142.4	841	3,531	83,990	126,094	213,614	1	1,500	100%	0%	0%	100%	213,614	0	0	213,614	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		71,205	71,205	71,205	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4523	Truck Wash Facility	1032	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Additonal Truck Wash Building - Demolish and foundations - Precast Footing (Perimeter Beam)		1,500	m2	0.1	2.2	14.5	21.8	38.5	218	3,267	21,762	32,671	57,701	1	1,125	100%	0%	0%	100%	57,701	0	0	57,701	Type A 2AM-MRY1325	Added	2017	Direct			33%	33%	33%						0		19,234	19,234	19,234	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1041	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-001	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1044	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-002	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1047	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #3 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-003	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1050	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #4 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-004	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1053	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #5 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-005	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1056	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation Module #6 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-006	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,909	4,367	7,451	1	52	100%	0%	0%	100%	7,451	0	0	7,451	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,484	2,484	2,484	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1059	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-007	67	m2	0.6	3.4	56.0	84.1	143.4	38	225	3,747	5,625	9,597	1	67	100%	0%	0%	100%	9,597	0	0	9,597	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,199	3,199	3,199	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1062	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FS-c	Buildings (Contaminated)	Prefabricated Special Modular		Power Generation E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4530-BLD-008	67	m2	0.6	3.4	56.0	84.1	143.4	38	225	3,747	5,625	9,597	1	67	100%	0%	0%	100%	9,597	0	0	9,597	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,199	3,199	3,199	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation	1065	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Power Generation Stores - Demolish and Decontaminate Building - ISO Shipping Container	4530-BLD-009	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,422	1,422	1,422	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation		BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Additional Buildings by BIM Site Services slab on grade		180	m2	0.1	1.9	12.5	18.8	33.1	23	338	2,248	3,375	5,961	0	0	100%	0%	0%	100%	5,961	0	0	5,961	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,987	1,987	1,987	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Electrical Office - Demolish and Decontaminate Building - Fold-away Building (Steel)	4530-BLD-BIM-001	20	m2	0.2	3.4	22.4	33.6	59.4	4	67	448	673	1,188	1	20	100%	0%	0%	100%	1,188	0	0	1,188	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		396	396	396	0	0	0	0	0

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M: Year 0 - %	C&M: Year 0+1 - %	Closure: Year 1 - %	Closure: Year 2 - %	Closure: Year 3 - %	Post Closure: Year 4 - %	Post Closure: Year 5 - %	Post Closure: Year 6 - %	Post Closure: Year 7 - %	Post Closure: Year 8 - %	C&M: Year 0 - Cost ($)	C&M: Year 0+1 - Cost ($)	Closure: Year 1 - Cost ($)	Closure: Year 2 - Cost ($)	Closure: Year 3 - Cost ($)	Post Closure: Year 4 - Cost ($)	Post Closure: Year 5 - Cost ($)	Post Closure: Year 6 - Cost ($)	Post Closure: Year 7 - Cost ($)	Post Closure: Year 8 - Cost ($)
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation		BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Electrical Shop - Demolish and Decontaminate Building - Fold-away Building (Steel)	4530-BLD-BIM-002	20	m2	0.2	2.4	15.7	23.5	41.6	3	47	314	471	831	1	20	100%	0%	0%	100%	831	0	0	831	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		277	277	277	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4530	Power Generation	4530	Power Generation		BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Electrical Shop - Demolish and foundations - Precast Footing (Perimeter Beam)	4530-BLD-BIM-002	20	m2	0.1	2.2	14.5	21.8	38.5	3	44	290	436	769	1	15	100%	0%	0%	100%	769	0	0	769	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		256	256	256	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1069	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Waste Management Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4540-BLD-001	446	m2	0.6	2.4	56.0	84.1	142.4	250	1,050	24,978	37,500	63,528	1	446	100%	0%	0%	100%	63,528	0	0	63,528	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		21,176	21,176	21,176	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1070	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Waste Management Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4540-BLD-001	446	m2	0.1	2.2	14.5	21.8	38.5	65	972	6,472	9,716	17,160	1	335	100%	0%	0%	100%	17,160	0	0	17,160	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,720	5,720	5,720	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1071	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Waste Management Building - Demolish floor finish - Slab on grade C/W Drainage	4540-BLD-001	446	m2	0.1	1.9	12.5	18.8	33.1	56	836	5,571	8,364	14,772	0	0	100%	0%	0%	100%	14,772	0	0	14,772	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		4,924	4,924	4,924	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1072	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Waste Incinerators - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4540-VP-001	52	m2	0.6	3.4	56.0	84.1	143.4	29	175	2,914	4,375	7,464	1	52	100%	0%	0%	100%	7,464	0	0	7,464	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,488	2,488	2,488	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management	1083	VP-	VP1	VENDOR PKG - Incinerator	VP1	Packaged Facilities	Incinerator		WASTE INCINERATOR VENDOR PACKAGE	4540-VP-001	1	Ea	47.0	480.0	4,695.9	4,800.0	9,975.9	47	480	4,696	4,800	9,976	329	329	100%	0%	0%	100%	9,976	0	0	9,976	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,325	3,325	3,325	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Existing Landfill		6,245	m2	0.2	2.0	22.2	22.2	44.4	1,527	12,659	138,352	138,730	289,742	0	0	100%	0%	0%	100%	289,742	0	0	289,742	Type A 2AM-MRY1325	Modified	2014	Direct				100%							0		0	289,742	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Landfill Expansion		4,475	m2	0.2	2.0	22.2	22.2	44.369	1,094	9,071	99,140	99,411	198,550	0	0	100%	0%	0%	100%	198,550	0	0	198,550	Type A 2AM-MRY1325		2015 A	Direct				100%							0		0	198,550	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Landfill Expansion		400	m2	0.2	2.0	22.2	22.2	44.4	98	811	8,862	8,886	17,747	0	0	100%	0%	0%	100%	17,747	0	0	17,747	Type A 2AM-MRY1325	Added	2015 R	Direct				100%							0		0	17,747	0	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Lined Containment Cell		900	m2	0.0	0.2	4.4	0.7	5.3	40	160	4,004	643	4,807	0	0	100%	0%	0%	100%	4,807	0	0	4,807	Type A 2AM-MRY1325		2015	Direct			33%	33%	33%						0		1,602	1,602	1,602	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-1	754	m2	0.0	0.2	4.4	0.7	5.3	34	134	3,355	539	4,028	0	0	100%	0%	0%	100%	4,028	0	0	4,028	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,343	1,343	1,343	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-2	1,298	m2	0.0	0.2	4.4	0.7	5.3	58	231	5,775	927	6,890	0	0	100%	0%	0%	100%	6,890	0	0	6,890	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		2,297	2,297	2,297	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-3	600	m2	0.0	0.2	4.4	0.7	5.3	27	107	2,669	429	3,185	0	0	100%	0%	0%	100%	3,185	0	0	3,185	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,062	1,062	1,062	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-4	649	m2	0.0	0.2	4.4	0.7	5.3	29	116	2,887	464	3,445	0	0	100%	0%	0%	100%	3,445	0	0	3,445	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		1,148	1,148	1,148	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-5	347	m2	0.0	0.2	4.4	0.7	5.3	15	62	1,544	248	1,842	0	0	100%	0%	0%	100%	1,842	0	0	1,842	Type A 2AM-MRY1325	Modified	2015 R	Direct			33%	33%	33%						0		614	614	614	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm	MS-HWB-6	550	m2	0.0	0.2	4.4	0.7	5.3	24	98	2,447	393	2,920	0	0	100%	0%	0%	100%	2,920	0	0	2,920	Type A 2AM-MRY1325	Added	2015 R	Direct			33%	33%	33%						0		973	973	973	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm - 2016 (new) - 1	MS-HWB-XX	360	m2	0.0	0.2	4.4	0.7	5.3	16	64	1,602	257	1,911	0	0	100%	0%	0%	100%	1,911	0	0	1,911	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		637	637	637	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm - 2016 (new) - 2	MS-HWB-XX	360	m2	0.0	0.2	4.4	0.7	5.3	16	64	1,602	257	1,911	0	0	100%	0%	0%	100%	1,911	0	0	1,911	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		637	637	637	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4540	Waste Management	4540	Waste Management			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Hazardous Waste Berm - 2016 (new-by generator) - 3	MS-HWB-XX	160	m2	0.0	0.2	4.4	0.7	5.3	7	28	712	114	849	0	0	100%	0%	0%	100%	849	0	0	849	Type A 2AM-MRY1325	Added	2016	Direct			33%	33%	33%						0		283	283	283	0	0	0	0	0
4000	Mine Site	4500	Non Process Facilities	4520	Services Area	4522	Services Equipment		BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Tire Shop at Ore Haul Truck Lineup (seacan construction)		500	m2	0.6	3.4	56.0	84.1	143.4	280	1,681	27,997	42,031	71,709	1	500	100%	0%	0%	100%	71,709	0	0	71,709	Type A 2AM-MRY1325	Added	2017	Direct			50%	50%							0		35,855	35,855	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System		ENE	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Diesel Module	Diesel Module 1	MR-FUM-FDI-010	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		1,420	0	1,420	0	0	0	0	1,420
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System		FIR	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Jet A1 Pump Module	Jet A1 Pump Module	MR-FUM-FUS-020-PUM01	1	Ea	8.1	106.5	809.3	1,065.0	1,980.8	8	107	809	1,065	1,981	1	1	100%	0%	0%	100%	1,981	0	0	1,981	Type A 2AM-MRY1325	Added	2015 R	Direct			33%		33%					33%	0		660	0	660	0	0	0	0	660
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4611	Containment Dyke			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Fuel Farm Tank Dike		1,911	m2	**0.0**	**0.2**	**4.4**	**0.7**	5.3	**85**	**340**	**8,503**	**1,366**	10,209	**0**	**0**	100%	0%	0%	100%	10,209	0	0	10,209	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		5,105	5,105	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4611	Containment Dyke			A3l	Grade & Re-Contour with Liner	A3l	Site Works	Grade and Re-Contour With Liner		Fuel Tank Containment Area		400	m2	0.0	0.2	4.4	0.7	5.3	18	71	1,780	286	2,137	0	0	100%	0%	0%	100%	2,137	0	0	2,137	Type A 2AM-MRY1325		2015	Direct			50%	50%							0		1,068	1,068	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1089	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Diesel Fuel Dispensing Module - Demolish and Decontaminate Building - ISO Shipping Container	4613-FD-013	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		2,133	2,133	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1101	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 8350 DIA H: 9140	4613-TK-009	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1102	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 8350 DIA H: 9140	4613-TK-010	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1103	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 8350 DIA H: 9140	4613-TK-011	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System	1104	TK-	MT2-d	Medium Diesel Tanks (500k L to 750k L)	MT2-d	Mechanical Equipment	Medium Diesel Tanks		TANK - ARCTIC DIESEL TANK W: 8350 DIA H: 9140	4613-TK-012	1	Ea	65.8	872.1	6,573.3	8,721.0	16,166.4	66	872	6,573	8,721	16,166	40	40	100%	0%	0%	100%	16,166	0	0	16,166	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,083	8,083	0	0	0	0	0	0
4000	Mine Site	4600	Fuel System	4610	Mine Tank Farm	4613	Arctic Diesel System		TK-	MT5-d	Medium Mobile Diesel Tanks (3000 L to 500k L)	MT5-d	Mechanical Equipment	Medium Mobile Diesel Tanks		50,000 L Portable Fuel Dispensing Unit		2	Ea	42.7	564.8	4,268.8	5,647.5	10,481.0	85	1,130	8,538	11,295	20,962	30	60	100%	0%	0%	100%	20,962	0	0	20,962	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%					33%	0		6,987	0	6,987	0	0	0	0	6,987
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1147	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - MINE WATER BUILDING DIESEL FUEL TANK - DTE ULC601-07	4720-TK-033	1	Ea	19.2	213.0	1,918.3	2,130.0	4,261.3	19	213	1,918	2,130	4,261	1	1	100%	0%	0%	100%	4,261	0	0	4,261	Type A 2AM-MRY1325	Added	2014	Direct			50%	50%							0		2,131	2,131	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4710	Raw Water Intake	4712	Raw Water System	1115	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Raw Water Pumphouse - Demolish and Decontaminate Building - Special Modular / Prefabricated	4712-BLD-001	15	m2	0.2	3.4	22.4	33.6	59.4	3	50	333	500	883	1	15	100%	0%	0%	100%	883	0	0	883	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		294	294	294	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4710	Raw Water Intake	4712	Raw Water System	1119	In Meters	piping	Piping	Piping	Bulks	Piping		Raw Water Supply Pipe - Piping Installation - Pumphouse to Water Building	4712.2-P	8,518	m	0.3	3.8	25.0	37.5	66.2	2,130	31,943	212,766	319,425	564,133	0	85	100%	0%	100%	0%	564,133	0	564,133	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		188,044	188,044	188,044	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1121	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Water Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4720-BLD-001	390	m2	0.2	2.4	15.7	23.5	41.6	61	919	6,120	9,188	16,226	1	390	100%	0%	0%	100%	16,226	0	0	16,226	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,409	5,409	5,409	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1122	BLD	CP	Precast Concrete Foundations - (480	CP	Flooring / Foundations	Precast Foundations		Water Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4720-BLD-001	390	m2	0.1	2.2	14.5	21.8	38.5	57	850	5,663	8,502	15,015	1	293	100%	0%	0%	100%	15,015	0	0	15,015	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		5,005	5,005	5,005	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1143	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - RAW WATER TANK	4720-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1144	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - FIRE WATER TANK	4720-TK-007	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1145	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - POTABLE WATER STORAGE TANK	4720-TK-009	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1146	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - BACKWASH SETTLING TANK	4720-TK-012	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems	1148	VP-	VP2	VENDOR PKG - Potable Water	VP2	Packaged Facilities	Potable Water		POTABLE WATER TREATMENT PLANT VENDOR PACKAGE	4720-VP-020	1	Ea	47.0	480.0	4,695.9	4,800.0	9,975.9	47	480	4,696	4,800	9,976	329	329	100%	0%	100%	0%	9,976	0	9,976	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		3,325	3,325	3,325	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems		TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - POTABLE WATER STORAGE TANK (40 m3)		1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325	Confirmed	2015 A	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems		TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - RAW WATER TANK (60 m3)		1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325	Confirmed	2015 A	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4720	Water Systems	4720	Water Systems			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Infill between service and utility pads		20,800	m2	0.01	0.1	1.3	0.4	1.8	264	3,042	26,395	8,248	37,654	0	0	100%	0%	0%	100%	37,654	0	0	37,654	Type A 2AM-MRY1325		2015 A	Direct			33%	33%	33%						0		12,551	12,551	12,551	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1151	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Sewage Chemical Storage Container - Demolish and Decontaminate Building - ISO Shipping Container	4731-BLD-001	30	m2	0.6	3.4	56.0	84.1	143.4	17	100	1,665	2,500	4,265	1	30	100%	0%	0%	100%	4,265	0	0	4,265	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		2,133	2,133	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1154	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR2-c	Buildings (Contaminated)	Double Trailer (2 or more)		Sewage Treatment Plant - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4731-VP-005	178	m2	0.6	3.4	56.0	84.1	143.4	100	600	9,991	15,000	25,591	1	178	100%	0%	0%	100%	25,591	0	0	25,591	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		12,796	12,796	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1160	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - TREATED EFFLUENT TANK	4731-TK-002	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		2,462	2,462	2,462	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1161	VP-	VP3	VENDOR PKG - Sewage Treatment Plant	VP3	Packaged Facilities	Sewage Treatment Plant		SEWAGE TREATMENT PLANT VENDOR PACKAGE	4731-VP-005	1	Ea	51.0	540.0	5,095.6	5,400.0	11,035.6	51	540	5,096	5,400	11,036	329	329	100%	0%	100%	0%	11,036	0	11,036	0	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		5,518	5,518	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4731	Sewage Treatment Systems	1163	In Meters	piping	Piping	Piping	Bulks	Piping		Sewage Treatment Piping - Piping Installation - Sewage truck bldg to STP	4731.2-P	247	m	0.3	3.8	25.0	37.5	66.2	62	926	6,170	9,263	16,358	0	2	100%	0%	100%	0%	16,358	0	16,358	0	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		8,179	8,179	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4732	Sewage Truck Building	1165	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Sewage Truck Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	4732-BLD-001	56	m2	0.6	2.4	56.0	84.1	142.4	31	131	3,122	4,688	7,941	1	56	100%	0%	0%	100%	7,941	0	0	7,941	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,971	3,971	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4732	Sewage Truck Building	1166	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Sewage Truck Building - Demolish and foundations - Precast Footing (Perimeter Beam)	4732-BLD-001	56	m2	0.1	2.2	14.5	21.8	38.5	8	121	809	1,215	2,145	1	42	100%	0%	0%	100%	2,145	0	0	2,145	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,073	1,073	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4732	Sewage Truck Building	1172	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MINE SEWAGE TRUCK BUILDING DIESEL FUEL TANK - DTE ULC601-07	4732-TK-003	1	Ea	15.5	195.0	1,548.7	1,950.0	3,693.7	16	195	1,549	1,950	3,694	20	20	100%	0%	0%	100%	3,694	0	0	3,694	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,847	1,847	0	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4730	Sewage System	4734	Treated Effluent Discharge	1178	In Meters	piping	Piping	Piping	Bulks	Piping		Treated Effluent Piping - Piping Installation - STP to connection with Stockpile Drain Pipe	4734.1-P	2,125	m	0.3	3.8	25.0	37.5	66.2	531	7,969	53,079	79,688	140,735	0	21	100%	0%	100%	0%	140,735	0	140,735	0	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		46,912	46,912	46,912	0	0	0	0	0
4000	Mine Site	4700	Site Utilities	4740	Additional Tanks	4740	Additional Tanks		TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		Additional Medium Size tanks		3	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	93	1,170	9,292	11,700	22,162	2	6	100%	0%	0%	100%	22,162	0	0	22,162	Type B Construction 2BC-MRY1416	Confirmed	2015 A	Direct			50%	50%							0		11,081	11,081	0	0	0	0	0	0

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Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1180	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accomodation Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-001
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1183	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accomodation Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-002
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1186	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-003
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1189	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-004
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1192	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Fuel Tank Farm E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-005
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1195	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Aerodrome Area E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-006
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1198	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Raw Water Supply E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-007
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1201	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Crushing & Screening E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-008
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1204	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 5kV & Ground Wire - Electrical distribution system from power gen to e-house	4750.2-E
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1205	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 600V - Connections from e-house to facilities	4750.3-E
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	1205	In Meters	cable	Cable	Cable	Bulks	Cable		Addtitional outdoor lighting for safety (with cables) at Mine Site	
4000	Mine Site	4700	Site Utilities	4750	Power Distribution System	4750	Power Distribution System	012	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #3 - Demolish and Decontaminate Building - Special Modular / Prefabricated	4750-BLD-012

ID CODE	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs
1180	59	m2	0.2	3.4	22.4	33.6	59.4	13	200	1,332	2,000	3,532	1	59	100%	0%	0%	100%	3,532	0	0	3,532	Type A 2AM-MRY1325		2014	Direct
1183	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct
1186	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct
1189	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct
1192	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct
1195	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct
1198	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	833	1,250	2,208	1	37	100%	0%	0%	100%	2,208	0	0	2,208	Type A 2AM-MRY1325		2014	Direct
1201	59	m2	0.2	3.4	22.4	33.6	59.4	13	200	1,332	2,000	3,532	1	59	100%	0%	0%	100%	3,532	0	0	3,532	Type A 2AM-MRY1325		2014	Direct
1204	11,000	m	0.1	1.5	10.0	15.0	26.5	1,100	16,500	109,905	165,000	291,405	0	110	100%	0%	0%	100%	291,405	0	0	291,405	Type A 2AM-MRY1325		2014	Direct
1205	5,200	m	0.1	1.5	10.0	15.0	26.5	520	7,800	51,955	78,000	137,755	0	52	100%	0%	0%	100%	137,755	0	0	137,755	Type A 2AM-MRY1325		2014	Direct
1205	3,500	m	0.1	1.5	10.0	15.0	26.5	350	5,250	34,970	52,500	92,720	0	35	100%	0%	0%	100%	92,720	0	0	92,720	Type A 2AM-MRY1325	Added	2017	Direct
012	37	m2	0.2	3.4	22.4	33.6	59.4	8	125	832	1,250	2,207	1	37	100%	0%	0%	100%	2,207	0	0	2,207	Type A 2AM-MRY1325		2015 A	Direct

	C&M		Closure			Post Closure					C&M		Closure			Post Closure				
ID CODE	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
1180			33%	33%	33%						0		1,177	1,177	1,177	0	0	0	0	0
1183			33%	33%	33%						0		736	736	736	0	0	0	0	0
1186			33%	33%	33%						0		736	736	736	0	0	0	0	0
1189			33%	33%	33%						0		736	736	736	0	0	0	0	0
1192			50%	50%							0		1,104	1,104	0	0	0	0	0	0
1195			33%	33%	33%						0		736	736	736	0	0	0	0	0
1198			33%	33%	33%						0		736	736	736	0	0	0	0	0
1201			33%	33%	33%						0		1,177	1,177	1,177	0	0	0	0	0
1204			33%	33%	33%						0		97,135	97,135	97,135	0	0	0	0	0
1205			33%	33%	33%						0		45,918	45,918	45,918	0	0	0	0	0
1205			33%	33%	33%						0		30,907	30,907	30,907	0	0	0	0	0
012			33%	33%	33%						0		736	736	736	0	0	0	0	0

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Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
7000	Construction Facilities & Services	7200	Milne Port	7210	Exploration Camp & Facilities	7211	Tent Camp		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		Matrix Camp		5,392	m2	0.2	2.7	17.9	26.9	47.5	967	14,505	96,619	145,054	256,178	1	2,696	100%	0%	0%	100%	256,178	0	0	256,178	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		85,393	85,393	85,393	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1222	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Construction Office - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	7231-BLD-001	268	m2	0.2	3.4	22.4	33.6	59.4	60	900	5,995	9,000	15,895	1	268	100%	0%	0%	100%	15,895	0	0	15,895	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,298	5,298	5,298	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1225	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Aerodrome Office - Demolish and Decontaminate Building - Trailer - Single	7231-BLD-002	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1226	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Aerodrome Office - Demolish and foundations - Timber Cribbing to Elevate Building	7231-BLD-002	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1230	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - AERODROME OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7231-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7231	Office Facilities	1231	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - AERODROME OFFICE RAW WATER TANK - NORWESCO L: 1613 W: 737 H: 1676	7231-TK-002	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1239	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Batch Plant Office-Lunchroom-W/C - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-003	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1240	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Batch Plant Office-Lunchroom-W/C - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-003	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1242	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Fuel Systems Office - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-005	45	m2	0.2	3.4	22.4	33.6	59.4	10	150	999	1,500	2,649	1	45	100%	0%	0%	100%	2,649	0	0	2,649	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,325	1,325	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1245	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Fuel Systems Lunchroom - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-006	45	m2	0.2	3.4	22.4	33.6	59.4	10	150	999	1,500	2,649	1	45	100%	0%	0%	100%	2,649	0	0	2,649	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,325	1,325	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1248	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Site Services Lunchroom #1 - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-007	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1249	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Lunchroom #1 - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-007	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1251	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Site Services Lunchroom #2 - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-008	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1252	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Lunchroom #2 - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-008	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1254	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Site Services Washcar #1 - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-009	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1255	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Washcar #1 - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-009	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1257	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Site Services Washcar #2 - Demolish and Decontaminate Building - Trailer - Single	7232-BLD-010	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1258	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Washcar #2 - Demolish and foundations - Timber Cribbing to Elevate Building	7232-BLD-010	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1260	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Smoke Shack - Demolish and Decontaminate Building - ISO Shipping Container	7232-BLD-011	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		711	711	711	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1269	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - BATCH PLANT OFFICE-LUNCHROOM-WC SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7232-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1270	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - BATCH PLANT OFFICE-LUNCHROOM-WC RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1613 W: 737 H: 1676	7232-TK-002	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1271	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - SITE SERVICES WASHCAR #1 SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7232-TK-004	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1272	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #1 RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7232-TK-005	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1273	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #2 SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7232-TK-007	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,074	1,074	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7232	Workforce Facilities	1274	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #2 RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7232-TK-008	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7234	Garages & Workshops		BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Exploration Workshops		250	m2	0.6	2.4	56.0	84.1	142.4	140	589	14,012	21,036	35,637	1	250	100%	0%	0%	100%	35,637	0	0	35,637	Type B Construction 2BC-MRY1416		2014	Direct				100%							0		0	35,637	0	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7234	Garages & Workshops		BLD	FF3-c	Modular Building Contaminated (480 ft2)	FF3-c	Buildings (Contaminated)	Soft walled Building (tent)		Toromont Maintenance Workshops soft (Contaminated)		878	m2	0.6	2.7	58.2	87.4	148.3	512	2,362	51,138	76,773	130,273	1	439	100%	0%	0%	100%	130,273	0	0	130,273	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		43,424	43,424	43,424	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7234	Garages & Workshops		BLD	FF3-c	Modular Building Contaminated (480 ft2)	FF3-c	Buildings (Contaminated)	Soft walled Building (tent)		Toromont Maintenance Workshops soft (Contaminated)		1,252	m2	0.6	2.7	58.2	87.4	148.3	730	3,369	72,929	109,488	185,785	1	626	100%	0%	0%	100%	185,785	0	0	185,785	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		61,928	61,928	61,928	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1283	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Construction Equipment Building - Demolish and Decontaminate Building - Fabric w/ Sea Can Walls	7235-BLD-001	223	m2	0.1	2.2	14.5	21.8	38.5	32	486	3,236	4,858	8,580	1	167	100%	0%	0%	100%	8,580	0	0	8,580	Type B Construction 2BC-MRY1416	Hold/ Remove	2014	Direct			33%	33%	33%						0		2,860	2,860	2,860	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1284	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Construction Equipment Building - Demolish and foundations - Precast Footing (Perimeter Beam)	7235-BLD-001	223	m2	0.1	2.2	14.5	21.8	38.5	32	486	3,236	4,858	8,580	1	167	100%	0%	0%	100%	8,580	0	0	8,580	Type B Construction 2BC-MRY1416	Hold/ Remove	2014	Direct			33%	33%	33%						0		2,860	2,860	2,860	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1286	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Site Services Heated Warehouse - Demolish and Decontaminate Building - Fold-away Building (Steel)	7235-BLD-002	372	m2	0.2	2.4	15.7	23.5	41.6	58	875	5,828	8,750	15,453	1	372	100%	0%	0%	100%	15,453	0	0	15,453	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,151	5,151	5,151	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1287	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Site Services Heated Warehouse - Demolish and foundations - Precast Footing (Perimeter Beam)	7235-BLD-002	372	m2	0.1	2.2	14.5	21.8	38.5	54	810	5,393	8,097	14,300	1	279	100%	0%	0%	100%	14,300	0	0	14,300	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		4,767	4,767	4,767	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1289	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Site Services Unheated Warehouse - Demolish and Decontaminate Building - Fold-away Building (Steel)	7235-BLD-003	372	m2	0.2	2.4	15.7	23.5	41.6	58	875	5,828	8,750	15,453	1	372	100%	0%	0%	100%	15,453	0	0	15,453	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		5,151	5,151	5,151	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses	1290	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Site Services Unheated Warehouse - Demolish and foundations - Precast Footing (Perimeter Beam)	7235-BLD-003	372	m2	0.1	2.2	14.5	21.8	38.5	54	810	5,393	8,097	14,300	1	279	100%	0%	0%	100%	14,300	0	0	14,300	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		4,767	4,767	4,767	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7230	Buildings, Shops & Warehouses	7235	Warehouses			25ka	Allowance - For Temporary construction warehouses and offices	25ka	Buildings (Contaminated)	Temporary construction warehouses and offices Allowance		Temporary construction warehouses and offices		1	Lot	94.3	1,415.1	9,434.0	14,150.9	25,000.0	94	1,415	9,434	14,151	25,000	0	0	100%	0%	0%	100%	25,000	0	0	25,000	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		8,333	8,333	8,333	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7250	Construction Facilities	7251	Concrete Facilities	1372	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Concrete Batch Plant Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	7251-BLD-001	669	m2	0.6	2.4	56.0	84.1	142.4	375	1,575	37,468	56,250	95,293	1	669	100%	0%	0%	100%	95,293	0	0	95,293	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		31,764	31,764	31,764	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7250	Construction Facilities	7251	Concrete Facilities	1373	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Concrete Batch Plant Building - Demolish and foundations - Precast Footing (Perimeter Beam)	7251-BLD-001	669	m2	0.6	2.4	56.0	84.1	142.4	375	1,575	37,468	56,250	95,293	1	669	100%	0%	0%	100%	95,293	0	0	95,293	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		31,764	31,764	31,764	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7250	Construction Facilities	7251	Concrete Facilities			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Batch Plant Stockpile		5,180	m2	0.0	0.1	1.3	0.4	1.8	66	758	6,574	2,054	9,386	0	0	100%	0%	0%	100%	9,386	0	0	9,386	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		3,129	3,129	3,129	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7270	Camp & Site Services	7273	Site Operations			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Existing Lined Storage Area		985	m2	0.0	0.2	4.4	0.7	5.3	44	175	4,384	704	5,263	0	0	100%	0%	0%	100%	5,263	0	0	5,263	Type B Construction 2BC-MRY1416	Check	2014	Direct			33%	33%	33%						0		1,754	1,754	1,754	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7270	Camp & Site Services	7273	Site Operations			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Existing Lined Storage Area		985	m2	0.0	0.2	4.4	0.7	5.3	44	175	4,384	704	5,263	0	0	100%	0%	0%	100%	5,263	0	0	5,263	Type B Construction 2BC-MRY1416	Check	2014	Direct			33%	33%	33%						0		1,754	1,754	1,754	0	0	0	0	0
7000	Construction Facilities & Services	7200	Milne Port	7210	Exploration Camp & Facilities	7212	Hardwall Camp		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		49-person Hard Wall Trailer Camp (previously at Steensby)		950	m2	0.2	3.4	22.4	33.6	59.4	213	3,194	21,277	31,944	56,416	1	950	100%	0%	0%	100%	56,416	0	0	56,416	Type A 2AM-MRY1325	Modified (2017A)	2017	Direct				100%							0		0	56,416	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7410	Exploration Camp & Facilities	7411	Tent Camp		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		Exploration Tent Camp Tents		2,400	m2	0.2	2.7	17.9	26.9	47.5	430	6,456	43,003	64,560	114,019	1	1,200	100%	0%	0%	100%	114,019	0	0	114,019	Type A 2AM-MRY1325		2014	Direct				100%							0		0	114,019	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7410	Exploration Camp & Facilities	7411	Tent Camp		BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Exploration Tent Camp Pad		9,432	m2	0.1	1.9	12.5	18.8	33.1	1,179	17,685	117,800	176,853	312,338	0	0	100%	0%	0%	100%	312,338	0	0	312,338	Type A 2AM-MRY1325		2014	Direct				100%							0		0	312,338	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7410	Exploration Camp & Facilities	7411	Tent Camp		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		Exploration Soft-Wall Camp (Weatherhaven)		6,017	m2	0.2	2.7	17.9	26.9	47.5	1,079	16,186	107,814	161,861	285,861	1	3,009	100%	0%	0%	100%	285,861	0	0	285,861	Type A 2AM-MRY1325		2014	Direct				100%							0		0	285,861	0	0	0	0	0	0

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M Year 0 - %	C&M Year 0+1 - %	Closure Year 1 - %	Closure Year 2 - %	Closure Year 3 - %	Post Closure Year 4 - %	Post Closure Year 5 - %	Post Closure Year 6 - %	Post Closure Year 7 - %	Post Closure Year 8 - %	C&M Year 0 - Cost ($)	C&M Year 0+1 - Cost ($)	Closure Year 1 - Cost ($)	Closure Year 2 - Cost ($)	Closure Year 3 - Cost ($)	Post Closure Year 4 - Cost ($)	Post Closure Year 5 - Cost ($)	Post Closure Year 6 - Cost ($)	Post Closure Year 7 - Cost ($)	Post Closure Year 8 - Cost ($)
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1401	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Batch Plant Office-Lunchroom-W/C - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-001	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1402	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Batch Plant Office-Lunchroom-W/C - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-001	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1404	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Fuel Systems Lunchroom - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-003	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,987	1,987	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1405	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Fuel Systems Lunchroom - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-003	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		695	695	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1407	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Fuel Systems Washcar - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-004	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		2,559	2,559	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1408	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Fuel Systems Washcar - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-004	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		371	371	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1410	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Site Services Lunchroom #1 - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-005	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1411	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Lunchroom #1 - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-005	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1413	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR1	Buildings (Not Contaminated)	Single Trailers (modular)		Site Services Lunchroom #2 - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-006	67	m2	0.2	3.4	22.4	33.6	59.4	15	225	1,499	2,250	3,974	1	67	100%	0%	0%	100%	3,974	0	0	3,974	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,325	1,325	1,325	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1414	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Lunchroom #2 - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-006	67	m2	0.1	1.2	7.8	11.8	20.8	8	79	525	788	1,391	0	20	100%	0%	0%	100%	1,391	0	0	1,391	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		464	464	464	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1416	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Site Services Washcar #1 - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-007	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1417	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Washcar #1 - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-007	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1419	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Site Services Washcar #2 - Demolish and Decontaminate Building - Trailer - Single	7432-BLD-008	36	m2	0.6	3.4	56.0	84.1	143.4	20	120	1,998	3,000	5,118	1	36	100%	0%	0%	100%	5,118	0	0	5,118	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		1,706	1,706	1,706	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1420	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Site Services Washcar #2 - Demolish and foundations - Timber Cribbing to Elevate Building	7432-BLD-008	36	m2	0.1	1.2	7.8	11.8	20.8	4	42	280	420	742	0	11	100%	0%	0%	100%	742	0	0	742	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		247	247	247	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1422	BLD	FF1-c	Modular Building Contaminated (480 ft2)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Smoke Shack - Demolish and Decontaminate Building - ISO Shipping Container	7432-BLD-009	15	m2	0.6	3.4	56.0	84.1	143.4	8	50	833	1,250	2,133	1	15	100%	0%	0%	100%	2,133	0	0	2,133	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		711	711	711	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1433	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - BATCH PLANT OFFICE-LUNCHROOM-WC SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7432-TK-001	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1434	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - BATCH PLANT OFFICE-LUNCHROOM-WC RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1613 W: 737 H: 1676	7432-TK-002	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1435	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - FUEL SYSTEMS WASHCAR SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7432-TK-004	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1436	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - FUEL SYSTEMS WASHCAR RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7432-TK-005	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		1,074	1,074	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1437	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - SITE SERVICES WASHCAR #1 SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7432-TK-007	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1438	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #1 RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7432-TK-008	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1439	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - SITE SERVICES WASHCAR #2 SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 610	7432-TK-010	1	Ea	31.0	390.0	3,097.3	3,900.0	7,387.3	31	390	3,097	3,900	7,387	2	2	100%	0%	0%	100%	7,387	0	0	7,387	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		3,694	3,694	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7432	Workforce Facilities	1440	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - SITE SERVICES WASHCAR #2 RAW WATER TANK - PLASTIC-MART 866-310-2556 L: 1803 W: 1245 H: 1346	7432-TK-011	1	Ea	9.7	107.5	965.8	1,075.0	2,148.3	10	108	966	1,075	2,148	1	1	100%	0%	0%	100%	2,148	0	0	2,148	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		716	716	716	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7434	Garages & Workshops		BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Exploration Workshops		182	m2	0.6	2.4	56.0	84.1	142.4	102	429	10,202	15,316	25,947	1	182	100%	0%	0%	100%	25,947	0	0	25,947	Type A 2AM-MRY1325		2014	Direct				100%							0		0	25,947	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7430	Buildings, Shops & Warehouses	7435	Warehouses			25ka	Allowance - For Temporary construction warehouses and offices	25ka	Buildings (Contaminated)	Temporary construction warehouses and offices Allowance		Temporary construction warehouses and offices		1	Lot	94.3	1,415.1	9,434.0	14,150.9	25,000.0	94	1,415	9,434	14,151	25,000	0	0	100%	0%	0%	100%	25,000	0	0	25,000	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		8,333	8,333	8,333	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7450	Construction Facilities	7451	Concrete Facilities	1513	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Concrete Batch Plant Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	7451-BLD-001	669	m2	0.6	2.4	56.0	84.1	142.4	375	1,575	37,468	56,250	95,293	1	669	100%	0%	0%	100%	95,293	0	0	95,293	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		31,764	31,764	31,764	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7450	Construction Facilities	7451	Concrete Facilities	1514	BLD	FF2-c	Fold Away Building Contaminated (480 ft2)	FFL-c	Buildings (Contaminated)	Fold Away Building		Concrete Batch Plant Building - Demolish and foundations - Precast Footing (Perimeter Beam)	7451-BLD-001	669	m2	0.6	2.4	56.0	84.1	142.4	375	1,575	37,468	56,250	95,293	1	669	100%	0%	0%	100%	95,293	0	0	95,293	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		31,764	31,764	31,764	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7470	Camp & Site Services	7473	Site Operations			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Bulk Fuel Storage Facility (Bladder Farm)		5,788	m2	0.0	0.2	4.4	0.7	5.3	257	1,030	25,749	4,136	30,915	0	0	100%	0%	0%	100%	30,915	0	0	30,915	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		15,458	15,458	0	0	0	0	0	0
7000	Construction Facilities & Services	7400	Mine Site	7470	Camp & Site Services	7473	Site Operations			A3I	Grade & Re-Contour with Liner	A3I	Site Works	Grade and Re-Contour With Liner		Barreled Fuel Line Containment		5,412	m2	0.0	0.2	4.4	0.7	5.3	241	964	24,076	3,867	28,907	0	0	100%	0%	0%	100%	28,907	0	0	28,907	Type A 2AM-MRY1325		2014	Direct			50%	50%							0		14,453	14,453	0	0	0	0	0	0

Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Issued on November 2, 2017

																																												C&M		Closure			Post Closure					C&M		Closure			Post Closure				
Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub ...	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	EPCM Services				Indirect	Indirect	Indirect	Indirect		Short Term C&M, Closure & Post-Closure Monitoring and reporting													3,766,032	0	0	97%	3%	0%	100%	3,656,488	109,544	0	3,766,032	Type A 2AM-MRY1325	Added	2015 R	Indirect	22%	28%	4%	6%	4%	12%	8%	7%	6%	5%	828,527	1,054,489	142,753	214,429	142,753	448,609	299,629	246,012	209,517	179,249
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													1,535,000	0	0	98%	2%	0%	100%	1,499,632	35,368	0	1,535,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		307,000	307,000	307,000	153,500	153,500	153,500	76,750	76,750
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													151,000	0	0	100%	0%	0%	100%	151,000	0	0	151,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		30,200	30,200	30,200	15,100	15,100	15,100	7,550	7,550
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													33,000	0	0	100%	0%	0%	100%	33,000	0	0	33,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		6,600	6,600	6,600	3,300	3,300	3,300	1,650	1,650
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													543,000	0	0	96%	4%	0%	100%	521,922	21,078	0	543,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		108,600	108,600	108,600	54,300	54,300	54,300	27,150	27,150
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													55,000	0	0	79%	21%	0%	100%	43,474	11,526	0	55,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		11,000	11,000	11,000	5,500	5,500	5,500	2,750	2,750
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8111	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Supervision, Project Management & Contract Administration													125,000	0	0	100%	0%	0%	100%	125,000	0	0	125,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		25,000	25,000	25,000	12,500	12,500	12,500	6,250	6,250
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													595,000	0	0	98%	2%	0%	100%	581,291	13,709	0	595,000	Type A 2AM-MRY1325		2014	Indirect			40%	30%	20%	10%					0		238,000	178,500	119,000	59,500	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													30,000	0	0	100%	0%	0%	100%	30,000	0	0	30,000	Type A 2AM-MRY1325		2015	Indirect			40%	30%	20%	10%					0		12,000	9,000	6,000	3,000	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													14,000	0	0	100%	0%	0%	100%	14,000	0	0	14,000	Type A 2AM-MRY1325		2015 A	Indirect			40%	30%	20%	10%					0		5,600	4,200	2,800	1,400	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													225,000	0	0	96%	4%	0%	100%	216,266	8,734	0	225,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			40%	30%	20%	10%					0		90,000	67,500	45,000	22,500	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													23,000	0	0	79%	21%	0%	100%	18,180	4,820	0	23,000	Type A 2AM-MRY1325	Added	2016	Indirect			40%	30%	20%	10%					0		9,200	6,900	4,600	2,300	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8110	EPCM Services	8112	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect	Indirect		Engineering Fees													49,000	0	0	100%	0%	0%	100%	49,000	0	0	49,000	Type A 2AM-MRY1325	Added	2017	Indirect			40%	30%	20%	10%					0		19,600	14,700	9,800	4,900	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													652,000	0	0	98%	2%	0%	100%	636,977	15,023	0	652,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		130,400	130,400	130,400	65,200	65,200	65,200	32,600	32,600
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													46,000	0	0	100%	0%	0%	100%	46,000	0	0	46,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		9,200	9,200	9,200	4,600	4,600	4,600	2,300	2,300
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													17,000	0	0	100%	0%	0%	100%	17,000	0	0	17,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		3,400	3,400	3,400	1,700	1,700	1,700	850	850
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													265,000	0	0	96%	4%	0%	100%	254,713	10,287	0	265,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		53,000	53,000	53,000	26,500	26,500	26,500	13,250	13,250
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													29,000	0	0	79%	21%	0%	100%	22,923	6,077	0	29,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		5,800	5,800	5,800	2,900	2,900	2,900	1,450	1,450
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													43,000	0	0	100%	0%	0%	100%	43,000	0	0	43,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		8,600	8,600	8,600	4,300	4,300	4,300	2,150	2,150
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													1,643,000	0	0	98%	2%	0%	100%	1,605,144	37,856	0	1,643,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		328,600	328,600	328,600	164,300	164,300	164,300	82,150	82,150
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													125,195	0	0	100%	0%	0%	100%	125,195	0	0	125,195	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		25,039	25,039	25,039	12,519	12,519	12,519	6,260	6,260
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													47,000	0	0	100%	0%	0%	100%	47,000	0	0	47,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		9,400	9,400	9,400	4,700	4,700	4,700	2,350	2,350
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													727,000	0	0	96%	4%	0%	100%	698,780	28,220	0	727,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		145,400	145,400	145,400	72,700	72,700	72,700	36,350	36,350
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													78,000	0	0	79%	21%	0%	100%	61,654	16,346	0	78,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		15,600	15,600	15,600	7,800	7,800	7,800	3,900	3,900
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Worker Accommodation & Camp Operation				Indirect	Indirect	Indirect	Indirect		Worker Accommodation & Camp Operation													117,000	0	0	100%	0%	0%	100%	117,000	0	0	117,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		23,400	23,400	23,400	11,700	11,700	11,700	5,850	5,850
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													1,524,000	0	0	98%	2%	0%	100%	1,488,886	35,114	0	1,524,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		304,800	304,800	304,800	152,400	152,400	152,400	76,200	76,200
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													76,000	0	0	100%	0%	0%	100%	76,000	0	0	76,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		15,200	15,200	15,200	7,600	7,600	7,600	3,800	3,800
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													35,000	0	0	100%	0%	0%	100%	35,000	0	0	35,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		7,000	7,000	7,000	3,500	3,500	3,500	1,750	1,750
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													577,000	0	0	96%	4%	0%	100%	554,603	22,397	0	577,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		115,400	115,400	115,400	57,700	57,700	57,700	28,850	28,850
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													58,000	0	0	79%	21%	0%	100%	45,846	12,154	0	58,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		11,600	11,600	11,600	5,800	5,800	5,800	2,900	2,900
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													126,000	0	0	100%	0%	0%	100%	126,000	0	0	126,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		25,200	25,200	25,200	12,600	12,600	12,600	6,300	6,300
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Off-Site Disposal of Waste & Material				Indirect	Indirect	Indirect	Indirect		Off-Site Disposal of Waste & Material													1,969,000	0	0	100%	0%	0%	100%	1,969,000	0	0	1,969,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		656,333	656,333	656,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													2,889,000	0	0	100%	0%	0%	100%	2,889,000	0	0	2,889,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		963,000	963,000	963,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													30,000	0	0	100%	0%	0%	100%	30,000	0	0	30,000	Type A 2AM-MRY1325		2015	Indirect			33%	33%	33%						0		10,000	10,000	10,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													9,000	0	0	100%	0%	0%	100%	9,000	0	0	9,000	Type A 2AM-MRY1325		2015 A	Indirect			33%	33%	33%						0		3,000	3,000	3,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													223,000	0	0	100%	0%	0%	100%	223,000	0	0	223,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		74,333	74,333	74,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													14,000	0	0	100%	0%	0%	100%	14,000	0	0	14,000	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		4,667	4,667	4,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													30,000	0	0	100%	0%	0%	100%	30,000	0	0	30,000	Type A 2AM-MRY1325	Added	2017	Indirect			33%	33%	33%						0		10,000	10,000	10,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)					Indirect	Indirect			Ammonium Nitrate (explosive material)													2,537,000	0	0	100%	0%	0%	100%	2,537,000	0	0	2,537,000	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		845,667	845,667	845,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment				Indirect	Indirect	Indirect	Indirect		Contaminated Soil Treatment													234,000	0	0	100%	0%	0%	100%	234,000	0	0	234,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		78,000	78,000	78,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													63,000	0	0	100%	0%	0%	100%	63,000	0	0	63,000	Type A 2AM-MRY1325	Added	2017	Indirect			33%	33%	33%						0		21,000	21,000	21,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													5,000	0	0	100%	0%	0%	100%	5,000	0	0	5,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		1,667	1,667	1,667	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													2,519,000	0	0	98%	2%	0%	100%	2,460,960	58,040	0	2,519,000	Type A 2AM-MRY1325		2014	Indirect			100%								0		2,519,000	0	0	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													202,000	0	0	100%	0%	0%	100%	202,000	0	0	202,000	Type A 2AM-MRY1325	Added	2017	Indirect			100%								0		202,000	0	0	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													232,000	0	0	100%	0%	0%	100%	232,000	0	0	232,000	Type A 2AM-MRY1325		2015	Indirect			100%								0		232,000	0	0	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													918,000	0	0	96%	4%	0%	100%	882,366	35,634	0	918,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			100%								0		918,000	0	0	0	0	0	0	0
9000	Owner Accounts	9100	Owner Accounts	9190	Contingency, Escalation, Event Risk Allowance	9191	Contingency				Indirect	Indirect	Indirect	Indirect		Contingency													93,000	0	0	79%	21%	0%	100%	73,511	19,489	0	93,000	Type A 2AM-MRY1325	Added	2016	Indirect			100%								0		93,000	0	0	0	0	0	0	0

APPENDIX D.9

AQUATIC EFFECTS MONITORING REPORTS

APPENDIX D.9.1

2016 CORE RECEIVING ENVIRONMENT MONITORING PLAN

minnow environmental inc.

A Trinity Consultants Company

Mary River Project 2016
Core Receiving Environment
Monitoring Program Report

Report Prepared For:
Baffinland Iron Mines Corporation
Mary River Project
Oakville, ON

Prepared By:
Minnow Environmental Inc.
Georgetown, ON

March 2017

Mary River Project 2016
Core Receiving Environment
Monitoring Program Report

Prepared for:

Baffinland Iron Mines Corp.
Mary River Project

Prepared by:
Minnow Environmental Inc.

Paul LePage, M.Sc
Project Manager

Pierre Stecko, M.Sc., EP
Senior Technical Reviewer

March 2017

EXECUTIVE SUMMARY

The Mary River Project is a high-grade iron ore mining operation located in the Qikiqtani Region of northern Baffin Island, Nunavut. Construction of mine infrastructure for the initial mining stages at the Mary River Project, which is owned and operated by Baffinland Iron Mines Corporation (Baffinland), occurred from mid-2013 through 2014. Surface mining commenced in mid-September 2014, and has since included pit bench development, ore haulage and stockpiling, and the crushing and screening of high-grade iron ore at the mine site. Crushed/screened ore is transported by truck to Milne Port, located approximately 100 km north of the mine site, where it is stockpiled before being loaded onto bulk carrier ships for transport to European markets during the summer ice-free period. Because no tailings are produced during the processing of the ore, the only mine waste management facility at the Mary River Project is a waste rock pad and disposal area, which has been established to the east of the current pit bench/mining operation. In addition to periodic discharge of treated effluent from the mine waste rock disposal area to the Mary River system, other potential mine inputs to aquatic systems located adjacent to the mine include runoff and dust from ore (crusher) stockpiles located on the mine site within the Sheardown Lake catchment, treated sewage effluent discharge to Mary River, runoff and explosives residue from quarry operations to the Camp Lake catchment, deposition of fugitive dust generated by mine activities, and general mine site runoff.

Under terms and conditions of a Type A water licence issued by the Nunavut Water Board, Baffinland was required to develop and implement an Aquatic Effects Monitoring Program (AEMP) at the Mary River Project. In order to meet the AEMP objectives for the Mary River Project, Baffinland developed a Core Receiving Environment Monitoring Program (CREMP) to provide a basis for the evaluation of potential mine-related influences on water quality, sediment quality and/or biota (including phytoplankton, benthic invertebrates and/or fish) within aquatic environments near the mine (Baffinland 2014; KP 2014a; NSC 2014). This report presents the results of the 2016 CREMP, including the evaluation of potential mine-related influences on chemical and biological conditions at mine-exposed water bodies following the first full year of mine operation.

The 2016 Mary River Project CREMP included water quality monitoring, sediment quality monitoring, phytoplankton (chlorophyll a) monitoring, benthic invertebrate community assessment and an Arctic charr (*Salvelinus alpinus*) fish population survey. The 2016 CREMP used an effects-based approach that incorporated standard environmental effects monitoring techniques as the basis for the evaluation of potential mine-related effects within the mine aquatic receivers. Additional evaluation of sedimentation-related effects was conducted as part of the 2016 CREMP in consideration of an Environment and Climate Change Canada *Fisheries Act* Direction (FAD) and an Indigenous and Northern Affairs Canada Letter of Non-Compliance (LNC) related to unauthorized sediment releases in 2016. The primary receiving systems that serve as the focus for the CREMP include the Camp Lake system (i.e., Camp Lake tributaries 1 and 2, Camp Lake), the Sheardown Lake system (i.e., Sheardown Lake tributaries 1, 9 and 12; Sheardown Lake NW and Sheardown Lake SE), and the Mary River and Mary Lake system. The evaluation of potential mine-related effects within these systems was based on comparisons of data collected in 2016 to applicable reference data and to available baseline data. The principal conclusions of the 2016 CREMP for each of these aquatic systems are discussed separately below.

Camp Lake System

Within the Camp Lake system, mine-related effects on water quality were apparent mainly within the main stem channel of Camp Lake Tributary 1 (CLT1) and at Camp Lake. Conductivity and concentrations of mine parameters including chloride, nitrate, sulphate and certain metals (e.g., iron, manganese, molybdenum, sodium, strontium and uranium) were the primary constituents reflecting a mine-related influence within CLT1 and Camp Lake in 2016 based on elevation relative to reference conditions and/or to the baseline (2005 – 2013) period. Of these parameters, only iron and uranium concentrations were above applicable water quality guideline (WQG) and/or AEMP benchmarks, but only at the upper-most monitoring station on the CLT1 main stem. Active quarrying at the QMR2 pit in 2016 likely served as the key source for these parameters at CLT1. Water chemistry at Camp Lake Tributary 2 (CLT2) was similar to applicable reference stations and to baseline water quality, with all parameters consistently observed at concentrations below applicable WQG and AEMP benchmarks. Overall, mine-related effects to water quality of the Camp Lake system were evident at the upper main stem of CLT1 and Camp Lake, with minimal effects suggested at CLT2, following the second year of mine operation. Sediment arsenic and manganese concentrations were slightly elevated at Camp Lake littoral stations compared to mean reference lake concentrations in 2016, and together with molybdenum, were also elevated compared to concentrations during the baseline period, suggesting a mine-related influence on sediment quality of Camp Lake. No metals were elevated in sediment of the profundal stations compared to the reference lake in 2016. Phosphorus was the only parameter observed at concentrations above sediment quality guidelines (SQG) in littoral and profundal sediment of Camp Lake that was not also above applicable SQG at the reference lake in 2016.

Chlorophyll a concentrations were elevated at the upper main stem of CLT1 and within Camp Lake compared to respective reference areas and to baseline data, suggesting slight enrichment possibly related to higher aqueous nitrate and/or micro-nutrient concentrations from Mary River Project mine activities. However, chlorophyll a concentrations at CLT1 north branch and lower main stem areas, and at CLT2 in 2016, were comparable to applicable reference and baseline concentrations. In addition, chlorophyll a concentrations were consistently well below the AEMP benchmark at all Camp Lake system receivers in 2016 indicating no adverse mine influence to phytoplankton. No adverse mine-related influences on the benthic invertebrate community of the Camp Lake system, including CLT1, CLT2 and Camp Lake, were indicated in 2016 based on comparisons to respective reference areas and to baseline data. Consistent with the chlorophyll a data, benthic invertebrate community data collected at the upper main stem of CLT1 suggested a slight enrichment-related influence based on higher invertebrate density, richness and proportion of Functional Feeding Group (FFG) filterers compared to an unnamed reference creek. The fish population survey suggested greater fish abundance compared to the reference lake in 2016, but similar numbers of Arctic charr in 2016 relative to the Camp Lake baseline studies. No significant, ecologically meaningful, differences in Arctic charr condition were indicated between Camp Lake and the reference lake in 2016, nor between Camp Lake Arctic charr collected in 2016 and the baseline period, for nearshore and littoral/profundal Arctic charr populations. Overall, consistent with the water chemistry and sediment chemistry generally meeting respective environmental quality guidelines and AEMP benchmarks, the phytoplankton, benthic invertebrate community and fish population survey data collectively suggested no adverse mine-related influences to the biota of the Camp Lake system in the second year of mine operation at the Mary River Project.

Sheardown Lake System

At Sheardown Lake Tributary 1 (SDLT1), aqueous concentrations of several parameters were elevated compared to average concentrations observed at the reference creek stations in 2016. However, similar to the 2015 CREMP, only nitrate and sulphate concentrations were elevated at SDLT1 in 2016 compared to the baseline period and, with the exception of copper, no parameters were present at concentrations above WQG or AEMP benchmarks in 2016. Within Sheardown Lake, aqueous total concentrations of aluminum, manganese, molybdenum and/or uranium were elevated compared to the reference lake in both 2015 and 2016, but none of these metals, or any other parameters, were elevated compared to concentrations observed during the baseline period, and none were above WQG or AEMP benchmarks. Similar to findings of the 2015 CREMP, elevated total aluminum and manganese concentrations were correlated with greater turbidity in 2016 suggesting that these metals were largely bound to/composed the suspended particulate matter and were not likely biologically available.

Sediment metal concentrations at Sheardown Lake littoral stations in 2016 were similar to those at the reference lake and compared to baseline data with the exception of slightly elevated arsenic, manganese and/or molybdenum concentrations, suggesting some mine-related influences on Sheardown Lake sediment quality. However, sediment metal concentrations at Sheardown Lake profundal stations in 2016 were similar to the reference lake and baseline data, indicating that mine-related influences on sediment quality were confined to littoral habitats. Notably, no metals were present in sediment of Sheardown Lake at concentrations above SQG or AEMP benchmarks that were not also above these criteria at the reference lake, suggesting the natural occurrence of elevated concentrations of some metals (e.g., iron, manganese) in sediment of lakes in the Mary River Project region.

Chlorophyll a concentrations at SDLT1 and Sheardown Lake were greater than concentrations observed at respective reference areas, but were similar to chlorophyll a concentrations reported during mine baseline and construction periods, respectively. In all cases, chlorophyll a concentrations were well below the AEMP benchmark at all Sheardown Lake system monitoring stations, suggesting no adverse mine-related effects to phytoplankton within the system. Consistent with higher chlorophyll a concentrations, greater relative abundance of FFG filterers and organism density at SDLT1 in 2016 compared to an unnamed reference creek and the baseline period, respectively, suggested a slight enrichment influence. However, a greater relative abundance of Habitat Preference Group (HPG) burrowers at SDLT1 and Sheardown Lake Tributary 12 (SDLT12) compared to an unnamed reference creek and to baseline data (SDLT12 only) was potentially indicative of sedimentation influences at these tributaries in 2016. No adverse mine-related influences to benthic invertebrate communities at Sheardown Lake Tributary 9 (SDLT9) and the Sheardown Lake littoral benthic invertebrate community were apparent in 2016 based on comparisons to respective reference areas and/or to baseline data. Greater Arctic charr abundance was suggested at the Sheardown Lake NW and SE basins compared to the reference lake in 2016, but similar abundance was suggested between the 2016 and baseline studies for both lake basins. The Arctic charr population exhibited different direction of significant responses in growth and condition between Sheardown Lake and the reference lake in 2016, and between Arctic charr collected at nearshore and littoral/profundal habitats for Sheardown Lake in 2016 compared to baseline studies. The differential responses in Arctic charr population endpoints suggested that the various differences between the mine-exposed and reference areas, or between studies at Sheardown Lake, reflected natural variability in the resident fish population. Overall, the chlorophyll a, benthic invertebrate community and Arctic charr fish population data all suggested no adverse mine-related influences to the biota of Sheardown Lake in the second year of mine operation at the Mary River Project.

Mary River and Mary Lake System

At Mary River, no adverse mine-related influences on water chemistry were apparent at the mine-exposed areas in 2016 based on comparisons to the Mary River upstream reference area and to baseline water chemistry taking influences of naturally high turbidity into account. At Mary Lake, aqueous total aluminum, manganese and uranium concentrations were elevated compared to the reference lake in 2016, but concentrations of these metals and all other parameters were comparable to concentrations during the baseline period, and none were above WQG or AEMP benchmarks. Similar to Sheardown Lake and Mary River, aluminum and manganese concentrations were correlated with turbidity at Mary Lake, which suggested that these metals were largely bound to/composed the suspended particulate matter and were thus unlikely to be biologically available. Sediment metal concentrations at Mary Lake littoral and profundal stations were similar to those at the reference lake in 2016 and, with the exception of slightly elevated sediment manganese concentrations at littoral stations, were similar to concentrations observed during the baseline period. Although sediment chromium, iron and manganese concentrations were above SQG at Mary Lake in 2016, with the exception of chromium, these metals were also above respective criteria at the reference lake indicating natural elevation and suggesting low potential for any adverse effects to biota associated with these metals. No metals were observed at concentrations above the sediment AEMP benchmarks at littoral and profundal stations of Mary Lake in 2016.

Chlorophyll a concentrations at Mary River and Mary Lake were, on average, similar to or slightly higher than concentrations at respective reference areas in 2016. Although relatively low chlorophyll a concentrations were observed at individual Mary River stations in 2015 and 2016 compared to the baseline period, these differences likely reflected naturally high turbidity in both 2015 and 2016, which would be expected to affect phytoplankton productivity by limiting the amount of light available for photosynthesis. In all cases, chlorophyll a concentrations were well below the AEMP benchmark, indicating no adverse mine-related influences to phytoplankton of the Mary River/Mary Lake system. The benthic invertebrate community of the Mary River exhibited few differences between mine-exposed and reference areas in 2016, and compared to respective areas during the baseline period, with the direction of the few differences in community composition between areas/studies opposite those normally reflective of an adverse mine-related effect. Benthic invertebrate community data collected at littoral habitat of Mary Lake in 2016 indicated significantly lower richness and differences in community composition compared to the reference lake that appeared to reflect natural differences in sediment physical properties between lakes. In part, this was supported by no significant differences in benthic metrics between 2016 and the baseline data for Mary Lake littoral stations. The fish population survey suggested greater fish abundance at Mary Lake compared to the reference lake in 2016. No significant or ecologically meaningful differences in growth and condition of nearshore captured Arctic charr occurred between Mary Lake and the reference lake in 2016, nor between Arctic charr collected in 2016 and the baseline period for nearshore and littoral/profundal Arctic charr populations at Mary Lake. Overall, the chlorophyll a, benthic invertebrate community and Arctic charr fish population data all suggested no adverse mine-related influences to the biota of Mary Lake in the second year of mine operation at the Mary River Project.

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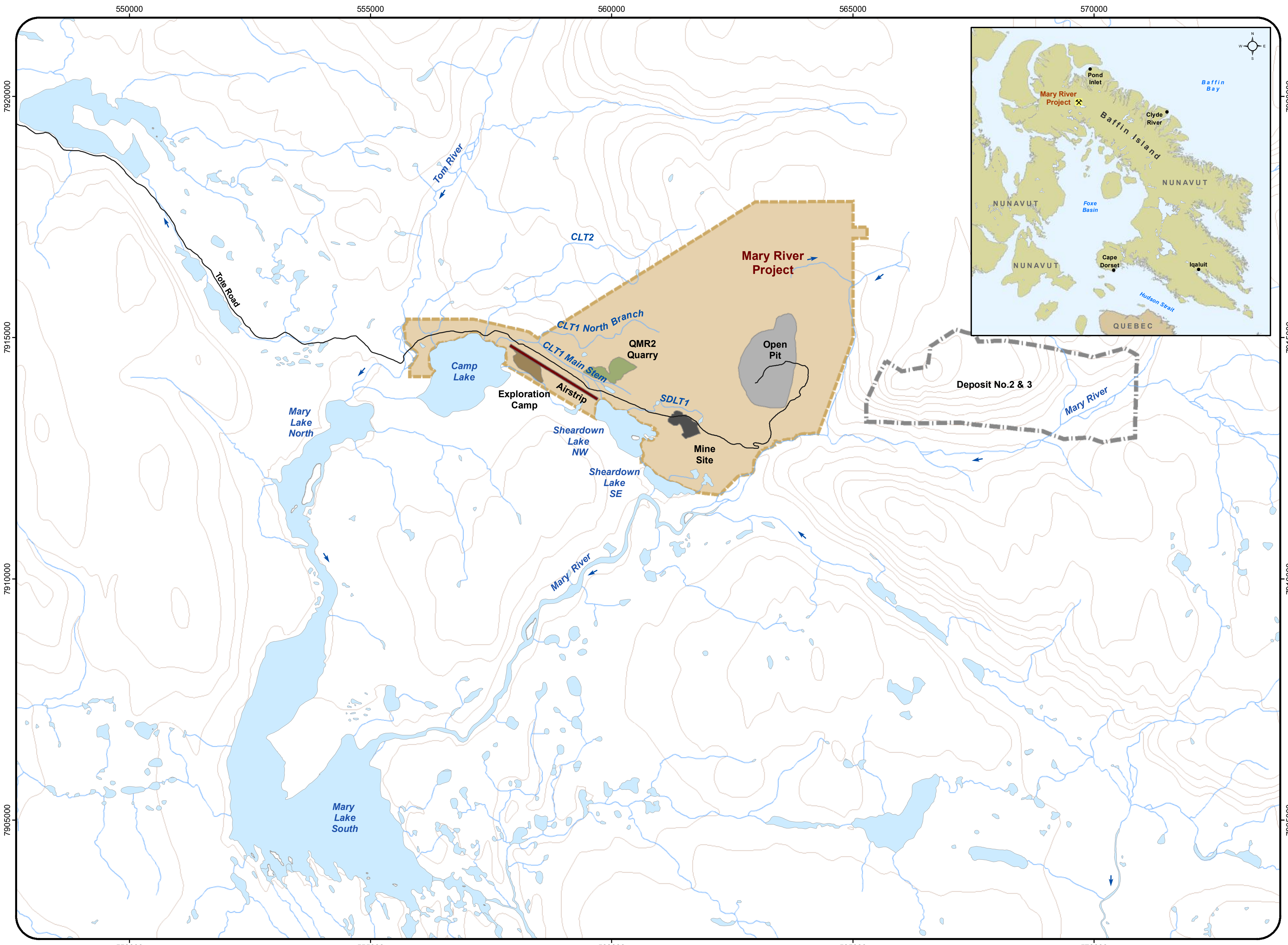
1.0 INTRODUCTION

1.1 Background

The Mary River Project, owned and operated by Baffinland Iron Mines Corporation (Baffinland), is a high-grade iron ore mining operation located in the Qikiqtani Region of northern Baffin Island, Nunavut (Figure 1.1). Construction of mine infrastructure for the initial mining stages at the Mary River Project, referred to as the Early Revenue Phase (ERP), commenced in mid-2013 and is currently on-going. Surface (contour strip) mining for the ERP commenced in mid-September 2014, and has since included pit bench development, ore haulage and stockpiling, and the crushing and screening of high-grade iron ore at the mine site. No milling or additional processing of the ore is conducted on-site. Baffinland has received approval to transport 3.5 million tonnes (Mt) of crushed/screened ore annually by truck to Milne Port, which is located approximately 100 km north of the mine site, for the ERP. At Milne Port, the ore is stockpiled before being loaded onto bulk carrier ships for transport to European markets during the summer ice-free period. No tailings are produced during ore processing, and therefore the only mine waste management facility at the Mary River Project is a waste rock pad and disposal area, which has been established to the east of the current pit bench/mining operation. In addition to periodic discharge of treated effluent from the mine waste rock disposal area to the Mary River system, other potential mine inputs to aquatic systems located adjacent to the mine include runoff and dust from ore (crusher) stockpiles located on the mine site within the Sheardown Lake catchment, treated mine camp sewage effluent discharge to Mary River, runoff and explosives residue from quarry operations to the Camp Lake catchment, deposition of fugitive dust generated by mine activities, and general mine site runoff.

Under terms and conditions of a Type A water licence issued by the Nunavut Water Board (No. 2AM-MRY1325 Amendment No. 1), Baffinland developed an Aquatic Effects Monitoring Program (AEMP) for the Mary River Project. A key objective of the AEMP was to provide data and information to allow the evaluation of short- and long-term effects of the project on aquatic ecosystems. To meet this objective, Baffinland developed a Core Receiving Environment Monitoring Program (CREMP) to assess potential mine-related influences on water quality, sediment quality and biota (including phytoplankton, benthic invertebrates and fish) at aquatic environments located near the mine (Baffinland 2014; KP 2014a; NSC 2014). In 2015, the CREMP approach transitioned from a characterization-based design to an effects-based approach that incorporated standard environmental effects monitoring techniques to allow the evaluation of mine-related effects within the mine aquatic receivers. Briefly, the 2015 study suggested some effects of the Baffinland mine operations on water quality and sediment



LEGEND

- Mary River Project
- QMR2 Quarry
- Exploration Camp
- Mine Site
- Open Pit
- Airstrip
- Lease Boundary For Deposit No. 2 & 3
- Waterbody
- Watercourse
- Tote Road
- Contours (20 m)
- Water Flow Direction

0 1 2 4
Kilometers

MAP INFORMATION
Map Projection: UTM Zone 17N NAD 1983
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Creation Date: March 2017
Project No.: 2569

Figure 1.1 : Baffinland Iron Mines Corporation, Mary River Project Location

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quality, but these effects were confined to single tributaries feeding into each of Camp and Sheardown lakes, as well as near the immediate outlets of these tributaries to each respective lake (Minnow 2016a). No adverse mine-related effects to phytoplankton, benthic invertebrate, or fish were suggested at any of the Camp, Sheardown or Mary lake systems in 2015 based on comparisons to representative reference waterbodies and to available pre-mine baseline data for each lake system (Minnow 2016a).

The CREMP was designed as an iterative series of monitoring and interpretative phases, with the results of previous studies used to inform the direction of future monitoring. Following the initial 2015 study, some minor adjustments were made to the 2016 CREMP to improve the ability of the program to meet overall objectives and provide greater efficiencies (Baffinland 2016a; Minnow 2016b). The key changes to the CREMP in 2016 included the addition of reference and mine-exposed creek benthic invertebrate community study areas and modification of the lake sediment/benthic invertebrate community survey to improve the ability of the program to assess mine-related influences. The 2016 CREMP also applied additional effort in examination of potential sedimentation-related effects during data evaluation in consideration of an Environment and Climate Change Canada (ECCC) *Fisheries Act* Direction (FAD) and an Indigenous and Northern Affairs Canada (INAC) Letter of Non-Compliance (LNC) issued to Baffinland in June 2016. The FAD and LNC were issued in response to unauthorized sediment releases, and specifically, aqueous Total Suspended Solids (TSS) concentrations above applicable discharge criteria, at several creeks on/adjacent to the mine property, mine tote road and/or mine haul road during May 2016 freshet (Baffinland 2016b).

The 2016 Mary River Project CREMP included water quality monitoring, sediment quality monitoring, phytoplankton monitoring, benthic invertebrate community assessment and an Arctic charr (*Salvelinus alpinus*) fish population assessment. This report presents the results of the 2016 CREMP, including the evaluation of potential Mary Lake Project-related influences on chemical and biological conditions at mine-exposed waterbodies following the initial two years of mine operation.

1.2 Report Organization

The content of this report reflects the requirements outlined within the CREMP study design (Baffinland 2014; KP 2014a; NSC 2014) and adjustments to the original program in consideration of the results from the 2015 CREMP (Baffinland 2016a; Minnow 2016b). A description of the aquatic environments that serve as the focus for the CREMP, as well as detailed methods used for evaluation of water quality, sediment quality and biological components (i.e., phytoplankton, benthic invertebrate communities and fish populations) for the 2016 study are provided in Section 2.0. Because of the relatively large geographic scope and multi-component sampling approach used for the Mary River Project CREMP, study results are presented in separate sections according to lake catchment (or sub-catchment, as applicable). Accordingly, water quality, sediment quality and biological effects assessment data and analysis for the Camp Lake system, the Sheardown Lake system (including separate evaluation for the northwest and southeast segments of the lake), and the Mary River/Mary Lake waterbodies are presented in Sections 3.0, 4.0 and 5.0, respectively. The conclusions of the 2016 CREMP are presented in Section 6.0. All references cited within this document are listed in Section 7.0.

Supporting information for the 2016 CREMP is provided in seven appendices. An assessment of the quality of data used for the 2016 study is provided as a Data Quality Review in Appendix A. Natural physico-chemical and biological characteristics important to the assessment of potential mine-related effects at the aquatic mine receiving environments were identified at the study reference areas, and therefore reference conditions are described more fully in Appendix B to provide context and perspective for the CREMP. In addition to all raw water quality data, the results of supplementary baseline lake water quality power analysis conducted to evaluate suitable sample sizes for lake water quality monitoring is presented in Appendix C. Supporting sediment quality information is provided in Appendix D. Finally, supporting biological data from the phytoplankton, benthic invertebrate community and fish population surveys are provided in Appendices E, F and G, respectively.

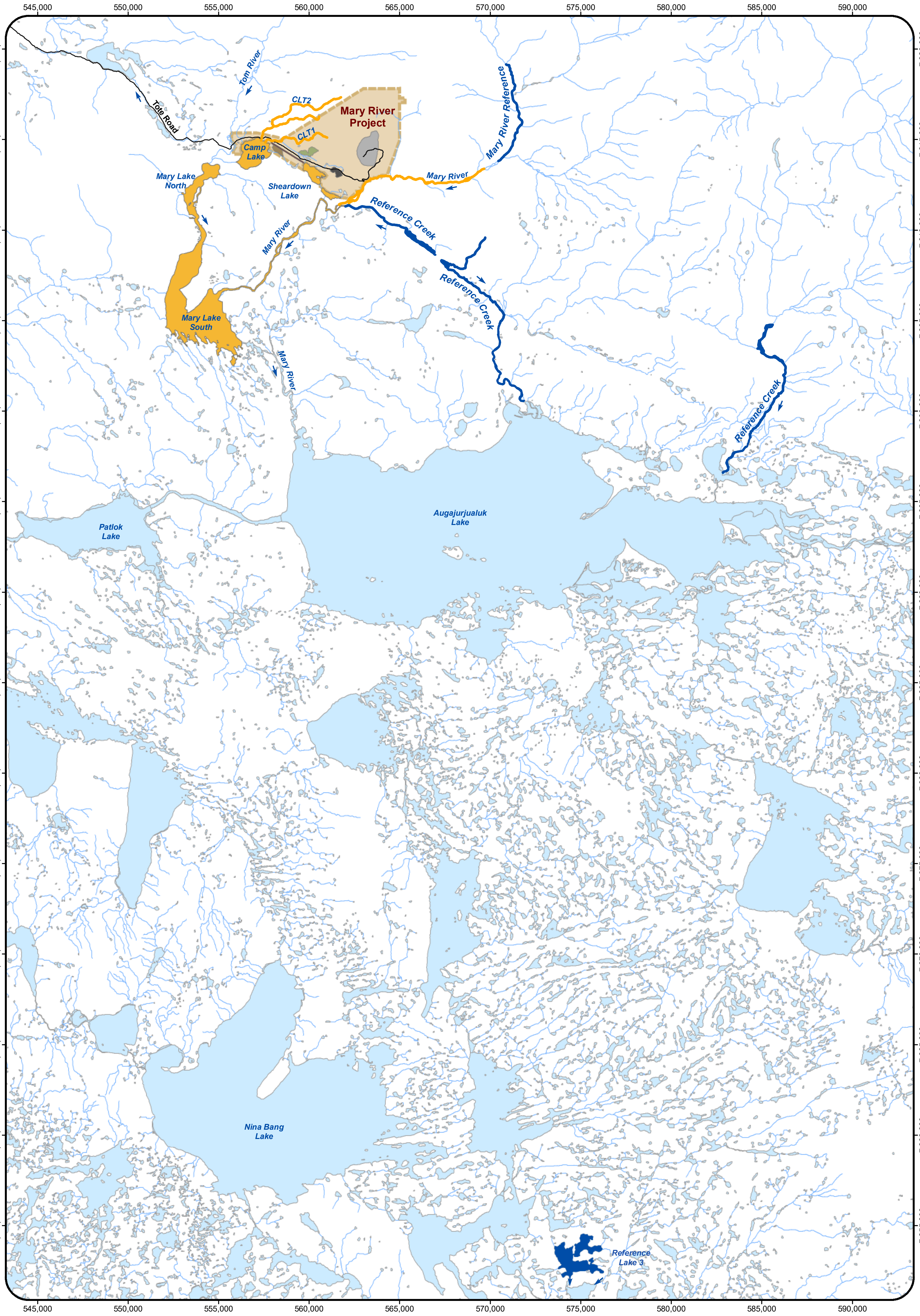
2.0 METHODS

The Mary River Project CREMP includes water quality monitoring, sediment quality monitoring, phytoplankton (chlorophyll a) monitoring, benthic invertebrate community assessment and a fish population assessment. In 2016, water quality and phytoplankton monitoring was conducted by Baffinland personnel over four separate sampling events, including an ice-cover event (April 23rd – May 7th) and open-water season events corresponding to Arctic spring (freshet), summer and autumn (June 25th – 27th, July 18th – 29th, and August 19th – 24th, respectively). Sediment quality, benthic invertebrate community and fish population sampling was conducted by Minnow Environmental Inc. (Minnow) personnel with assistance from Baffinland environment department staff from August 11th – 19th 2016, the seasonal timing of which was consistent with monitoring for previous baseline (2005 – 2013), mine construction (2014), and mine operational (2015) periods at the Mary River Project mine site. Similar to the 2015 CREMP, the 2016 program included field sampling and standard laboratory quality assurance/quality control (QA/QC) for individual water quality, sediment quality and benthic invertebrate community study components to allow for an assessment of the overall quality of each respective data set (Appendix A).

The 2016 CREMP study areas included the same mine-exposed and reference waterbodies established in the original design documents (Baffinland 2014; KP 2014a; NSC 2014) and the same reference lake that was added to the program in 2015 (Figure 2.1). To simplify the discussion of results, the mine-exposed study areas were separated by lake catchment as follows:

- the Camp Lake system (Camp Lake Tributaries 1 and 2, and Camp Lake);
- the Sheardown Lake system (Sheardown Lake Tributaries 1, 9 and 12, Sheardown Lake Northwest [NW], and Sheardown Lake Southeast [SE]); and,
- the Mary River/Mary Lake system.

Reference Lake 3, which served as a reference waterbody for lentic (lake) environments beginning in the previous 2015 CREMP study, was again used as the reference lake for the 2016 study. Reference Lake 3 is located approximately 62 km south of the Mary River Project (Figure 2.1), and is well outside the area of any potential mine influence. Streams used as reference areas in the current and previous CREMP included an unnamed tributary to the Mary River and two unnamed tributaries to Angajurjuatuk Lake, all of which are located southeast of the mine (Figure 2.1). As in the previous CREMP studies, an area of Mary River located well upstream of current Baffinland mine activity (i.e., GO-09) served as a reference area for the mine-exposed portion of Mary River in the 2016 study (Figure 2.1).



LEGEND

- Mary River Project
- Reference Stream/River System
- Mine Exposed Stream/River System
- Mine Exposed Lake
- Reference Lake
- Open Pit
- QMR2 Quarry
- Airstrip
- Exploration Camp
- Mine Site
- Waterbody
- Watercourse
- Tote Road

0 2.75 5.5 11
Kilometers

MAP INFORMATION
Map Projection: UTM Zone 17N NAD 1983
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Creation Date: March 2017
Project No.: 2569

Figure 2.1: Mary River Project CREMP Study Water Bodies.

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2.1 Water Quality

Surface water quality monitoring was conducted by Baffinland environment department personnel at the sampling locations and frequencies stipulated in the Mary River Project CREMP design (Baffinland 2014; KP 2014a). The surface water sampling was conducted at as many as 57 stations per sampling period (Table 2.1; Figures 2.2 and 2.3), and included collection of *in-situ* measurements and water chemistry data.

2.1.1 In-situ Water Quality Measurement Data Collection and Analysis

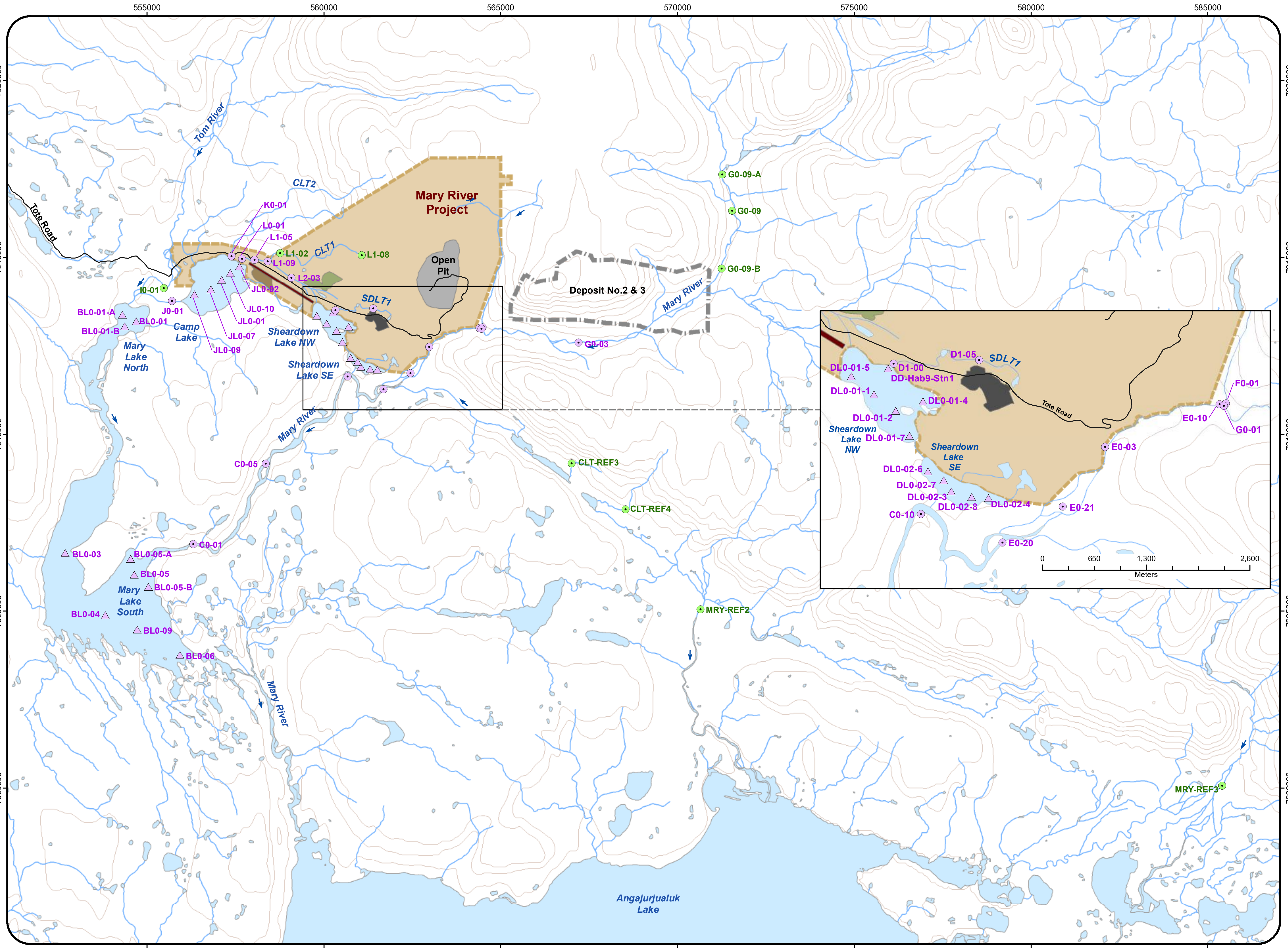
In-situ measurements of water temperature, dissolved oxygen, pH, specific conductance (i.e., temperature standardized measurement of conductivity) and turbidity were taken at the bottom of the water column at all lotic (i.e., creek, river) stations and as a vertical profile at one-meter intervals at each lentic (i.e., lake) water quality monitoring station during routine monitoring conducted by Baffinland. These *in-situ* measurements were also collected at the surface and bottom (i.e., approximately 30 cm above the water-sediment interface) at all lake benthic invertebrate community (benthic) stations during the fall biological sampling completed by Minnow, with the exception of turbidity measurements. The *in-situ* measurements were collected using YSI 556 MDS (Multiparameter Display System) or Pro DSS meters equipped with YSI 6820 or YSI 600Q sondes, respectively (YSI Inc., Yellow Springs, OH). Meter readings for pH, specific conductance and turbidity were checked against standard solutions and calibrated as necessary on the day of field sampling. Dissolved oxygen concentration readings were checked and calibrated at greater frequency through each sampling day in response to changing sampling conditions (e.g., changes in elevation, barometric pressure and/or ambient temperature). During the April-May under-ice sampling event, a gas-powered, 15 centimeter (6-inch) diameter ice auger was used to access the water column at all lake water quality monitoring stations. All ice shavings were removed from the auger hole prior to the collection of *in-situ* measures. To avoid confounding influences associated with snow/ice melt in the auger hole, the *in-situ* measurements were collected beginning just below the ice layer. Additional supporting observations of water colour and clarity were recorded at the time of water quality and biological sampling at all benthic stations, and Secchi depth was measured at all lake stations using the methods outlined in Wetzel and Likens (2000).

In-situ water quality data collected at the mine-exposed study streams, rivers and lakes were compared to respective reference area data, to applicable water quality guidelines (i.e., the Canadian Water Quality Guidelines [WQG; CCME 1999, 2016]) and, for pH and conductivity, to baseline data. The evaluation of the *in-situ* dissolved oxygen concentration and pH data included comparisons to WQG. *In-situ* water quality data were compared spatially within each system (i.e., from upstream- to downstream-most stations) using both qualitative and statistical

Table 2.1: Mary River Project CREMP water quality and phytoplankton monitoring station coordinates and annual sampling schedule.

Study System	Water Body	Station ID	UTM Zone 17N, NAD83		Ref. Data Set [a]	Sampling Season			
			Easting	Northing		Winter (Apr. - May)	Spring (June)	Summer (July)	Fall (Aug. - Sept.)
Reference Areas	Lotic Reference	CLT-REF3	567004	7909174	na	-	✓	✓	✓
		CLT-REF4	568533	7907874		-	✓	✓	✓
		MRY-REF3	585407	7900061		-	✓	✓	✓
		MRY-REF2	570650	7905045		-	✓	✓	✓
	Reference Lake 3	REF-03-W1	575642	7852666	na	-	-	✓	✓
		REF-03-W2	574836	7852744		-	-	✓	✓
		REF-03-W3	574158	7853237		-	-	✓	✓
Camp Lake System	Camp Lake Tributaries	I0-01	555470	7914139	a	-	✓	✓	✓
		J0-01	555701	7913773		-	✓	✓	✓
		K0-01	557390	7915030		-	✓	✓	✓
		L0-01	557681	7914959		-	✓	✓	✓
		L1-02	558765	7915121		-	✓	✓	✓
		L1-05	558040	7914935		-	✓	✓	✓
		L1-08	561076	7915068		-	✓	✓	✓
		L1-09	558407	7914885		-	✓	✓	✓
		L2-03	559081	7914425		-	✓	✓	✓
	Camp Lake	JL0-01	557108	7914369	b	✓	-	✓	✓
		JL0-02	557615	7914750		✓	-	✓	✓
		JL0-07	556800	7914094		✓	-	✓	✓
		JL0-09	556335	7913955		✓	-	✓	✓
		JL0-10	557346	7914562		✓	-	✓	✓
Sheardown Lake System	Sheardown Tributary 1	D1-00	560329	7913512	a	-	✓	✓	✓
		D1-05	561397	7913558		-	✓	✓	✓
	Sheardown Lake NW	DD-Hab9-Stn1	560259	7913455	b	✓	-	✓	✓
		DL0-01-1	560080	7913128		✓	-	✓	✓
		DL0-01-2	560353	7912924		✓	-	✓	✓
		DL0-01-4	560695	7913043		✓	-	✓	✓
		DL0-01-5	559798	7913356		✓	-	✓	✓
		DL0-01-7	560525	7912609		✓	-	✓	✓
	Sheardown Lake SE	DL0-02-3	561046	7911915	b	✓	-	✓	✓
		DL0-02-4	561511	7911832		✓	-	✓	✓
		DL0-02-6	560756	7912167		✓	-	✓	✓
		DL0-02-7	560952	7912054		✓	-	✓	✓
		DL0-02-8	561301	7911846		✓	-	✓	✓
Mary River and Mary Lake System	Mary River	G0-09-A	571264	7917344	a	-	✓	✓	✓
		G0-09	571546	7916317		-	✓	✓	✓
		G0-09-B	571248	7914682		-	✓	✓	✓
		G0-03	567204	7912587	a,c	-	✓	✓	✓
		G0-01	564459	7912984		-	✓	✓	✓
		F0-01	564483	7913015		-	✓	✓	✓
		E0-21	562444	7911724		-	✓	✓	✓
		E0-20	561688	7911272		-	✓	✓	✓
		E0-10	564405	7913004		-	✓	✓	✓
		E0-03	562974	7912472		-	✓	✓	✓
		C0-10	560669	7911633		-	✓	✓	✓
		C0-051	558352	7909170		-	✓	✓	✓
		C0-01	556305	7906894		-	✓	✓	✓
	Mary Lake (North Basin)	BL0-01	554691	7913194	b	✓	-	✓	✓
		BL0-01-A	554300	7913378		✓	-	✓	✓
		BL0-01-B	554369	7913058		✓	-	✓	✓
	Mary Lake (South Basin)	BL0-03	552680	7906651	b	✓	-	✓	✓
		BL0-04	553817	7904886		✓	-	✓	✓
		BL0-05	554632	7906031		✓	-	✓	✓
		BL0-06	555924	7903760		✓	-	✓	✓
		BL0-05-A	554530	7906478		✓	-	✓	✓
		BL0-05-B	555034	7905692		✓	-	✓	✓
		BL0-09	554715	7904479		✓	-	✓	✓

[a] Reference data applicable to indicated study area include a - lotic reference stations; b - lentic reference stations; and, c - Mary River upstream stations.



LEGEND

Water Monitoring Stations

- Lake - Mine Exposed
- Stream - Mine Exposed
- Stream - Reference
- Mary River Project
- QMR2 Quarry
- Exploration Camp
- Mine Site
- Open Pit
- Airstrip
- Lease Boundary For Deposit No. 2 & 3
- Waterbody
- Watercourse
- Contours (20 m)
- Tote Road
- Water Flow Direction

N S E W

0 1.5 3 6
Kilometers

MAP INFORMATION
Map Projection: UTM Zone 17N NAD 1983
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Figure 2.2 : Mary River Project, CREMP Routine Water Quality and Phytoplankton Monitoring Station Locations

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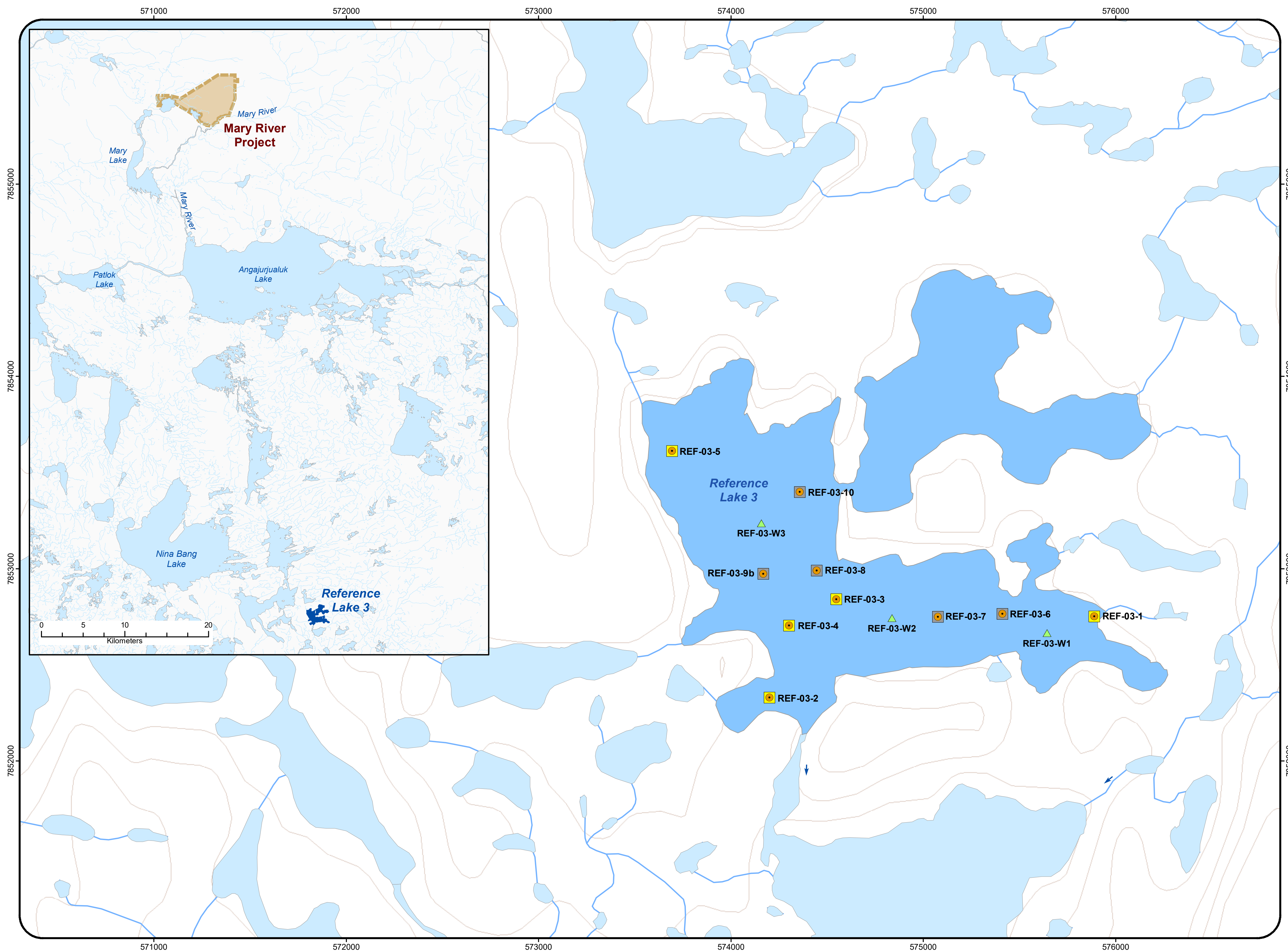

LEGEND

- Sediment and Benthic Monitoring Location
- Water Quality and Phytoplankton Monitoring Station
- Littoral Sampling Depth
- Profundal Sampling Depth
- Reference Lake
- Waterbody
- Watercourse
- Tote Road
- Contours (20 m)
- Water Flow Direction

N W E S

0 0.25 0.5 1
Kilometers

MAP INFORMATION
Map Projection: UTM Zone 17N NAD 1983
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Figure 2.3: Mary River Project CREMP Reference Lake 3 Monitoring Station Locations

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approaches. For the statistical analysis, raw data and log-transformed data were assessed for normality and homogeneity of variance prior to conducting comparisons between (pair-wise) or among (multiple-group) applicable like-habitat mine-exposed and reference study areas using Analysis-of-Variance (ANOVA). The selection of whether untransformed or log-transformed data were used for the ANOVA tests was determined based on which data best met the assumptions of ANOVA. In instances where normality could not be achieved through data transformation, non-parametric Mann-Whitney U-test and Kruskal-Wallis H-test statistics were applied using the raw data to validate the pair-wise and multiple-group ANOVA statistical results, respectively. Similarly, in instances in which variances of normal data could not be homogenized by transformation, Student's t-tests assuming unequal variance were applied using either raw or log-transformed data to validate the pair-wise ANOVA statistical results. In cases in which multiple-group comparisons were conducted, Tukey's Honestly Significant Difference (HSD) or Tamhane's pair-wise *post-hoc* tests were implemented for homogenous and non-homogenous data, respectively All statistical comparisons were conducted using SPSS Version 12.0 software (SPSS Inc., Chicago, IL).

Vertical profiles of the *in-situ* measurements taken from lake stations were plotted and visually assessed to evaluate potential thermal, dissolved oxygen or chemical (i.e., pH and/or specific conductance) stratification and the corresponding depths associated with any distinct layering. The occurrence of a thermocline was assessed as a ≥1˚C change in temperature per 1 m incremental change in depth (Wetzel 2001). The vertical profile data collected at the mine-exposed study lakes were compared to that of the reference lake for each seasonal monitoring event using profile data averaged for each incremental depth below the water surface among lake stations by season. At each study lake, spatial and seasonal differences in the vertical profile plots were evaluated to provide better understanding of natural conditions and/or mine-related influences on within-lake water quality. Additional evaluation of the *in-situ* dissolved oxygen concentration and pH data included comparisons to WQG (CCME 1999, 2016).

2.1.2 Water Chemistry Sampling and Data Analysis

Surface water chemistry samples were collected from both lotic and lentic environments (Table 2.1). At lotic stations, the water chemistry samples were collected from approximately mid-water column by hand directly into pre-labeled sample bottles which, for those requiring preservation, were pre-dosed with required chemical preservatives. At lentic stations, two water chemistry samples were collected, one approximately 1 m below the surface (or just below the ice layer for the winter sampling event) and the other from approximately 1 m above the bottom, using a non-metallic beta-bottle, vertically-oriented 2.2 L TT Silicon Kemmerer bottle (Wildco Supply Co., Yulee, FL) or, for winter sampling only, a stainless steel Kemmerer bottle. During the winter sampling event, the water column was accessed at the same time and using the same methods as described above for the *in-situ* measurements. Lake water collected using the beta-bottle/Kemmerer bottle was transferred directly into sample bottles that had been pre-dosed with required chemical preservatives, where appropriate, except those requiring field filtration. In cases in which filtration of lotic and lentic station water samples was required (e.g., for dissolved metals), filtration was conducted in the field using methods consistent with AEMP protocols (Baffinland 2014).

Following collection, the water chemistry samples were placed into coolers in the field and maintained at cool temperatures for shipment to the analytical laboratory. Quality assurance/ quality control (QA/QC) for the field water chemistry sampling program included trip blanks, field blanks, and the collection of equipment blanks and field duplicates with replication conducted on as many as 10% of the total samples collected for each CREMP sampling event (Appendix A). The water chemistry samples were shipped on ice to ALS Canada Ltd. (ALS; Waterloo, ON) for analysis of pH, conductivity, hardness, total suspended solids (TSS), total dissolved solids (TDS), anions (alkalinity, bromide, chloride, sulphate), nutrients (ammonia, nitrate, nitrite, total Kjeldahl nitrogen [TKN], total phosphorus), dissolved and total organic carbon (DOC and TOC, respectively), mercury, total and dissolved metals, and phenols using standard laboratory methods.

The water chemistry data were compared: i) among mine-exposed and reference areas for each study lake catchment (Table 2.1); ii) spatially and seasonally at each mine-exposed waterbody; iii) to applicable water quality guidelines/objectives for the protection of aquatic life (Table 2.2); iv) to site specific water quality benchmarks developed for the Mary River Project AEMP (Intrinsik 2014); and, v) to baseline water quality data. For data screening, and to simplify discussion of results, the magnitude of difference in parameter concentrations was calculated as the mine-exposed area mean concentration divided by the respective reference station/area mean concentration using the 2016 data. Similarly, for temporal comparisons, the magnitude of difference in parameter concentrations was calculated by dividing the individual mine-exposed station/area 2016 mean concentrations by the baseline (2005 - 2013) mean concentration for each parameter. The resulting magnitude of differences in parameter concentrations were qualitatively assigned as slightly, moderately or highly elevated compared to reference and/or baseline conditions using the categorization described in Table 2.3.

Applicable water quality guidelines/objectives included CWQG (CCME 1999, 2016) or, for parameters with no CWQG, the most conservative (i.e., lowest) criterion available from established Ontario Provincial Water Quality Objectives (PWQO; OMOEE 1994) or British Columbia Water Quality Guidelines (BCWQG; BCMOE 2006, 2016). The water quality

Table 2.2: Water quality guidelines used for the Mary River Project 2015 and 2016 CREMP.

Parameters		Units	Water Quality Guideline (WQG)[a]	Criteria Source[a]	Supporting Information and/or Calculations Used to Derive Hardness Dependent Criteria
Conventionals	pH (lab)	pH	6.5 - 9.0	CWQG	
Nutrients and Organics	Nitrate	mg/L	13	CWQG	
	Nitrite	mg/L	0.06	CWQG	
	Total Phosphorus	mg/L	0.020	PWQO	Total phosphorus objective is 0.020 mg/L for lotic (rivers, streams) environments, and 0.030 mg/L for lentic (lake) environments.
	Phenols	mg/L	0.001	PWQO	
Anions	Chloride (Cl)	mg/L	120	CWQG	
	Sulphate (SO_4)	mg/L	218	BCWQG	Sulphate guideline is hardness (mg/L $CaCO_3$) dependent as follows: 128 mg/L at 0 - 30 hardness, 218 mg/L at 31 - 75 hardness, 309 mg/L at 76 - 180 hardness, and 429 mg/L at 181 - 250 hardness. Sample-specific (mean) hardness was used for screening purposes. Value presented applicable to water with 75 mg/L hardness.
Total Metals	Aluminum (Al)	mg/L	0.100	CWQG	
	Antimony (Sb)	mg/L	0.020	PWQO	
	Arsenic (As)	mg/L	0.005	CWQG	
	Beryllium (Be)	mg/L	0.011	PWQO	
	Boron (B)	mg/L	1.5	CWQG	
	Cadmium (Cd)	mg/L	0.00012	CWQG	Cadmium guideline is hardness (mg/L $CaCO_3$) dependent. For hardness between 17 and 280 mg/L, the cadmium guideline is calculated using the equation Cd (ug/L) = $10^{(0.83[\log(\text{hardness}] -2.46)}$. Sample-specific (mean) hardness was used for screening purposes. Value presented applicable to water with 75 mg/L hardness.
	Chromium (Cr)	mg/L	0.0089	CWQG	
	Cobalt (Co)	mg/L	0.001	PWQO	
	Copper (Cu)	mg/L	0.002	CWQG	Copper guideline is hardness (mg/L $CaCO_3$) dependent. At hardness <82 mg/L and >180 mg/L, the copper guideline is 2 and 4 ug/L, respectively. For hardness ranging from 82 - 180 mg/L, the copper guideline (ug/L) = 0.2 * $e^{(0.8545[\ln(\text{hardness}] - 1.463)}$. Sample-specific (mean) hardness was used for screening purposes. Value presented applicable to water with 75 mg/L hardness.
	Iron (Fe)	mg/L	0.30	CWQG	
	Lead (Pb)	mg/L	0.002	CWQG	Lead guideline is hardness (mg/L $CaCO_3$) dependent. At hardness <60 mg/L and >180 mg/L, the lead guideline is 1 and 7 ug/L, respectively. For hardness ranging from 60 - 180 mg/L, the lead guideline (ug/L) = $e^{(1.273[\ln(\text{hardness}] - 4.705)}$. Sample-specific (mean) hardness was used for screening purposes. Value presented applicable to water with 75 mg/L hardness.
	Manganese (Mn)	mg/L	0.935	BCWQG	Manganese guideline is hardness (mg/L $CaCO_3$) dependent, and calculated using the equation Mn (ug/L) = 0.0044 * (hardness) + 0.605. Sample-specific (mean) hardness was used for screening purposes. Value presented applicable to water with hardness of 75 mg/L.
	Mercury (Hg)	mg/L	0.000026	CWQG	
	Molybdenum (Mo)	mg/L	0.073	CWQG	
	Nickel (Ni)	mg/L	0.077	CWQG	Nickel guideline is hardness (mg/L $CaCO_3$) dependent. At hardness <60 mg/L and >180 mg/L, the nickel guideline is 25 and 150 ug/L, respectively. For hardness ranging from 60 - 180 mg/L, the nickel guideline (ug/L) = $e^{(0.76[\ln(\text{hardness}] + 1.06)}$. Sample-specific (mean) hardness was used for screening purposes. Value presented applicable to water with 75 mg/L hardness.
	Selenium (Se)	mg/L	0.001	CWQG	
	Silver (Ag)	mg/L	0.00025	CWQG	
	Thallium (Tl)	mg/L	0.0008	CWQG	
	Tin (Sn)	mg/L	-	-	
	Titanium (Ti)	mg/L	-	-	
	Tungsten	mg/L	0.030	PWQO	
	Uranium (U)	mg/L	0.015	CWQG	
	Vanadium (V)	mg/L	0.006	PWQO	
	Zinc (Zn)	mg/L	0.030	CWQG	

[a] Canadian Environment Water Quality Guideline for the protection of aquatic life (CCME1999, 2016) was selected where a CCME guideline exists. Where no CCME guideline exists, the selected criteria is the lowest of either the Ontario Provincial Water Quality Objective (PWQO; MOE 1994) or the British Columbia Water Quality Guideline (BCWQG; BCMOE 2013), as available.

Table 2.3: Categorization of magnitudes of difference used for screening parameter concentrations between mine-exposed areas and reference areas, and between 2016 and baseline data for individual mine-exposed stations/areas, Mary River Project CREMP, 2016.

Categorization	Magnitude of Difference Criterion
Slightly elevated	Concentration 3-fold to 5-fold higher at mine-exposed area versus the reference area or baseline data, as applicable.
Moderately elevated	Concentration 5-fold to 10-fold higher at mine-exposed area versus the reference area or baseline data, as applicable.
Highly elevated	Concentration ≥ 10-fold higher at mine-exposed area versus the reference area or baseline data, as applicable.

guidelines used in this 2016 CREMP were abbreviated simply as ‘WQG’, although it is recognized that in certain cases the values presented may represent water quality ‘objectives’. For those water quality guidelines that are hardness dependent, the hardness of the individual sample was used to calculate the water quality guideline for the specific parameter according to established formulae (Table 2.2). The 2016 water chemistry data were also compared to site specific water quality benchmarks developed for the Mary River Project AEMP (Intrinsik 2014). The Mary River Project AEMP water chemistry benchmarks were derived using an evaluation of background (i.e., baseline) water chemistry data together with existing generic water quality guidelines that consider aquatic toxicity thresholds. The AEMP benchmarks were developed to inform management decisions under the AEMP assessment approach and management response framework (Baffinland 2014). An elevation in parameter concentration above the respective AEMP benchmark may trigger various actions (e.g., sampling design modifications, additional statistical assessment, considerations for mitigation, etc.) to better understand and potentially mitigate effects resulting from elevated concentrations of the parameter of concern (Baffinland 2014). Water chemistry data for key parameters (i.e., parameters with concentrations that were notably higher at mine-exposed areas compared to reference areas, that were historically identified as site-specific parameters of concern, and/or that were above WQG and/or AEMP benchmarks) were plotted to evaluate changes in concentrations in 2016 compared to baseline (2005 – 2013) and previous mine construction (2014) and operational (2015) periods.

2.2 Sediment Quality

The objective of the sediment quality monitoring component of the original Mary River Project CREMP was to assess the potential effects of mine operation on sediment quality of lake environments based on a gradient design (Baffinland 2014; KP 2014a, 2015). In 2016, the lake sediment quality monitoring approach was modified to an effects-based design that included both sediment quality and benthic invertebrate community sampling at littoral stations while maintaining key profundal stations for the long-term monitoring of changes in lake sediment chemistry. Under the modified 2016 design, sediment quality sampling was conducted at five littoral stations (i.e., water depths approximately between 7 m and 12 m) and three profundal stations (i.e., water depths greater than approximately 18 m) at each study lake except Sheardown Lake SE (Table 2.4; Figure 2.4). Because the maximum depth of Sheardown Lake SE reaches approximately 14 m, only 'littoral' depth samples were collected at this lake. Although the CREMP also proposed sediment sampling within Camp Lake tributaries (three stations), Sheardown Lake tributaries (six stations) and within the Mary River (four stations), as in previous studies conducted in 2014 and 2015, these watercourses were found to contain limited depositional habitat during the 2016 field survey. The general absence of any substantial accumulation of fine sediments within these watercourses precluded any meaningful assessment of potential mine-related influences on sediment chemistry within, along and/or between watercourses, and therefore no sediment sampling was conducted at lotic environments as part of the 2016 CREMP.

2.2.1 Sample Collection and Laboratory Analysis

Sediment samples for physical and chemical characterization were collected at the study lakes using a gravity corer (Hoskin Scientific Ltd., Model E-777-00) outfitted with a clean 5.1 cm inside-diameter polycarbonate tube. From each retrieved core sample containing an intact, representative sediment-water interface, the surficial two centimetres of sediment was manually extruded upwards into a graded core collar, sectioned with a stainless steel core knife, and placed into a pre-labeled plastic sample bag. Samples from three cores treated in this manner were composited to create a single sample at each station. Supporting measurements of total core sample length and depths of any visually-apparent redox boundaries/horizons, as well as notes regarding sediment texture and colour for each visible horizon, general sediment odour (e.g., hydrogen sulphide), and presence of algae or plants on or in the sediment, were recorded for each core sample. For QA/QC purposes, a field duplicate 'split' sample was collected at all study lakes except Sheardown Lake SE using the same coring methods discussed above but twice the number of replicate core samples taken (Table 2.4; Appendix A). Following collection, all sediment samples were placed into a cooler, transported to the mine and stored under cool conditions until shipment to the analytical laboratory.

Upon completion of the biological monitoring field program, sediment samples were shipped to ALS (Waterloo, ON). Physical characterization of samples included percent moisture and

Table 2.4: Mary River Project CREMP lake sediment quality and benthic invertebrate community monitoring station coordinates, 2016.

Waterbody	Station Code	UTM Zone 17W, NAD83		New (2016) or Existing Station	Sampling Habitat	Sample Type	
		Easting	Northing			Sediment Sampling [a]	Benthic Invertebrate Community
Reference Lake	REF-03-1	575889	7852752	Existing	littoral	✓	✓
	REF-03-2	574200	7852330	Existing	littoral	✓	✓
	REF-03-3	574548	7852842	Existing	littoral	✓	✓
	REF-03-4	574301	7852705	Existing	littoral	✓	✓
	REF-03-5	573694	7853613	Existing	littoral	✓	✓
	REF-03-6	575411	7852766	Existing	profundal	✓	✓
	REF-03-7	575076	7852750	Existing	profundal	✓	✓
	REF-03-8	574445	7852992	Existing	profundal	✓	✓
	REF-03-9[b]	574168	7852975	Existing	profundal	✓	✓
	REF-03-10	574358	7853400	Existing	profundal	✓	✓
Camp Lake	JLO-02[b]	557619	7914753	Existing	littoral	✓	✓
	JLO-21	556926	7914911	Existing	littoral	✓	✓
	JLO-32	557590	7914174	New	littoral	✓	✓
	JLO-14	557246	7914224	Existing	profundal	✓	-
	JLO-31	557213	7913826	New	littoral	✓	✓
	JLO-07	556803	7914095	Existing	profundal	✓	-
	JLO-11	556594	7913929	Existing	profundal	✓	-
	JLO-30	556446	7913562	New	littoral	✓	✓
Sheardown Lake Northwest (NW)	DLO-01-5	559806	7913348	Existing	profundal	✓	-
	DD-HAB 9-STN2	560315	7913398	Existing	littoral	✓	✓
	DLO-01-8	560338	7913192	Existing	littoral	✓	✓
	DLO-01	560079	7913132	Existing	profundal	✓	-
	DLO-01-9	560740	7913073	Existing	littoral	✓	✓
	DLO-01-2[b]	560350	7912927	Existing	profundal	✓	-
	DLO-01-3	560478	7912827	Existing	littoral	✓	✓
	DLO-01-10	560471	7912574	New	littoral	✓	✓
Sheardown Lake Southwest (SE)	DLO-02-1	560813	7912114	Existing	littoral	✓	✓
	DLO-02-11	561680	7911809	Existing	littoral	✓	✓
	DLO-02-9	561419	7911808	Existing	littoral	✓	✓
	DLO-02-13	561245	7911947	Existing	profundal	✓	✓
	DLO-02-3	561043	7911919	Existing	profundal	✓	✓
Mary Lake	BLO-01	554690	7913194	Existing	littoral	✓	✓
	BLO-20	554382	7906326	New	littoral	✓	✓
	BLO-11	554872	7905869	Existing	littoral	✓	✓
	BLO-12	554644	7905742	Existing	profundal	✓	-
	BLO-21	554966	7905443	New	littoral	✓	✓
	BLO-10	555033	7905065	Existing	profundal	✓	-
	BLO-08	555424	7904239	Existing	profundal	✓	-
	BLO-22	555607	7904040	New	littoral	✓	✓
	BLO-06[b]	555925	7903771	Existing	littoral	✓	✓

[a] Sediment core samples analyzed for particle size, TOC and total metals. Composite of three cores, using top 3 cm of sediment.

[b] Duplicate sediment core sample collected for quality control/quality assurance (QA/QC).

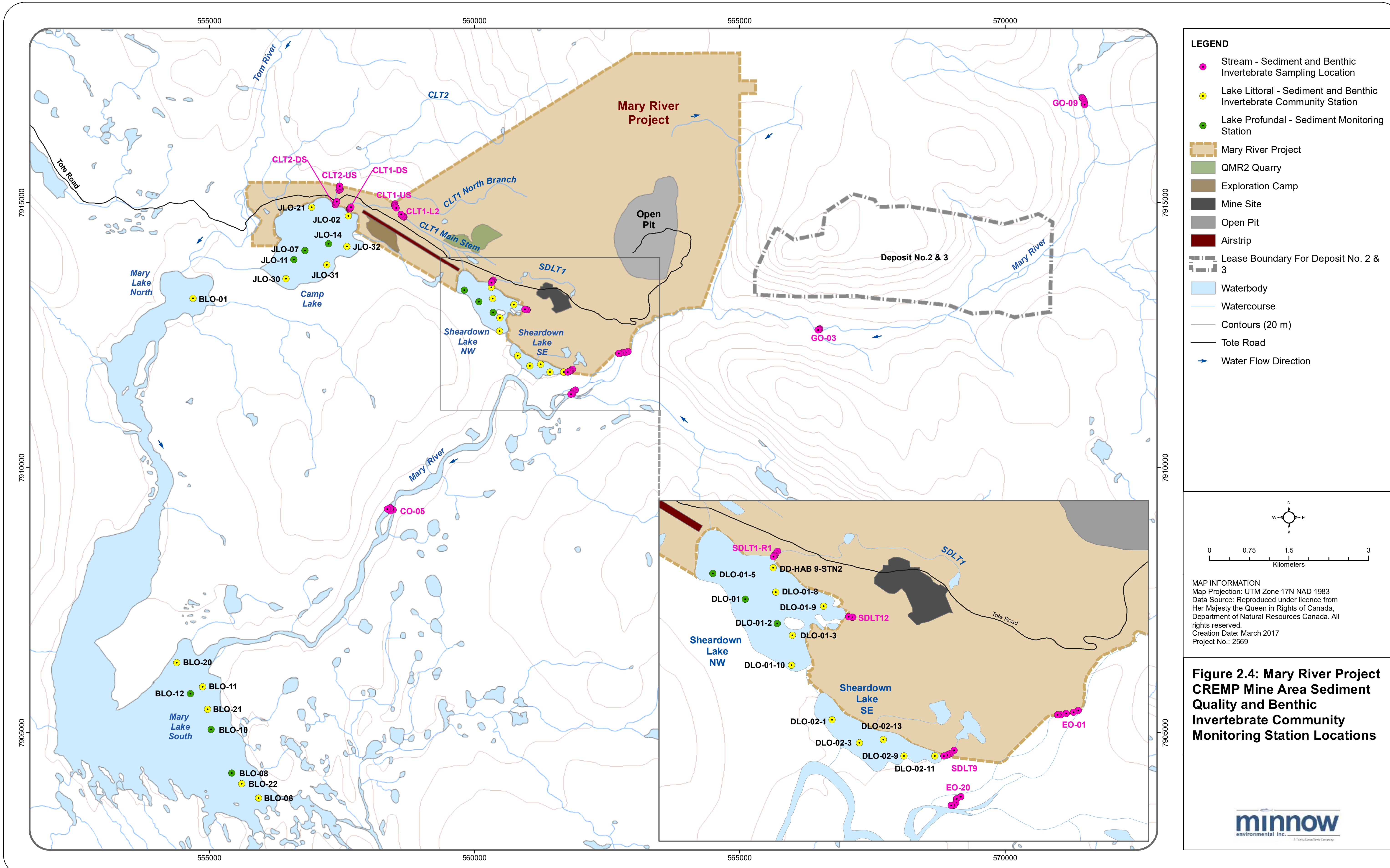

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Figure 2.4: Mary River Project CREMP Mine Area Sediment Quality and Benthic Invertebrate Community Monitoring Station Locations

particle size analyses, and chemical characterization included analyses of total organic carbon (TOC) and total metals including mercury. Standard laboratory methods were used for all physical and chemical sediment analyses.

2.2.2 Data Analysis

Sediment quality data from the mine-exposed areas were compared to reference area data, to applicable sediment quality guidelines/AEMP benchmarks and, where applicable, to baseline sediment quality data. Sediment physical characteristics (i.e., moisture, particle size) and TOC were statistically summarized based on separate calculation of mean, standard deviation, standard error, minimum and maximum for littoral and profundal habitat at each study lake. These data were compared statistically between mine-exposed and reference study areas using the same tests, transformations (with the exception that logit transformations were conducted for dependent proportional data rather than log transformations), assumptions and software described previously for the statistical evaluation of *in-situ* water quality (see Section 2.1.1).

The sediment chemistry data from the mine-exposed lakes were initially assessed to identify potential gradients in sediment metal concentrations with distance from known or suspected sources of mine-related deposits to the lake. Sediment chemistry data were then averaged by study lake and compared between mine-exposed and reference areas. For each sediment chemistry parameter, the data from each study lake were separately averaged for littoral and profundal habitat and then compared between each respective mine-exposed and reference lake based on the magnitude of difference in parameter concentrations. The magnitude of difference between the mine-exposed and reference lakes was calculated and compared as described previously (Section 2.1.2; Table 2.3).

Sediment chemistry data were compared to applicable Canadian Sediment Quality Guidelines (CSQG; CCME 1999, 2015) probable effect levels (PEL) or, for parameters with no CSQG, to Ontario Provincial Sediment Quality Guidelines (PSQG; OMOE 1993) severe effect levels (SEL). The sediment quality guidelines used for the 2016 CREMP were abbreviated simply as 'SQG', although it is recognized that the values presented may represent either national PEL or Ontario provincial SEL guidelines. The 2016 sediment chemistry data analyses also included comparisons to Mary River Project AEMP sediment quality benchmarks that were derived using baseline sediment chemistry data for each mine-exposed lake and existing generic CSQG interim or PSQG lowest effect level sediment quality guidelines (Intrinsik 2014, 2015). As indicated previously, the AEMP benchmarks were developed to inform management decisions under the AEMP assessment approach and management response framework (Baffinland 2014). An elevation in parameter concentration above the AEMP benchmark may trigger various actions to better understand and potentially mitigate effects resulting from elevated concentrations of the parameter of concern (Baffinland 2014).

Sediment chemistry data for key parameters (i.e., parameters with concentrations that were notably higher at mine-exposed areas compared to the reference area, that have been identified as site-specific parameters of concern in previous studies, and/or those with concentrations above SQG and/or AEMP benchmarks) were plotted to evaluate potential changes in parameter concentrations among 2016 data, baseline (2005 – 2013) data, and previous 2015 mine operation period data. In addition, as described previously, the magnitude of difference was calculated for all parameters between 2016 and baseline data for each individual study lake using the same calculation (and categorization description) as described previously (Section 2.1.2; Table 2.3).

2.3 Biological Assessment

2.3.1 Phytoplankton

The Mary River Project CREMP uses measures of aqueous chlorophyll *a* concentrations to assess potential mine-related influences to phytoplankton. Because chlorophyll *a* is the primary pigment of phytoplankton (i.e., algae and other photosynthetic microbiota suspended in the water column), aqueous chlorophyll *a* concentrations are often used as a surrogate for evaluating the amount of photosynthetic microbiota in aquatic environments (Wetzel 2001). Chlorophyll *a* samples were collected at the same stations and same time as the collection of water chemistry samples by Baffinland environmental department staff (Table 2.1; Figures 2.2 and 2.3). Water samples for chlorophyll *a* analyses were collected using the same methods and equipment, and at the same locations, as described for water chemistry samples (Section 2.1.2). The chlorophyll *a* samples were collected into 1 L glass amber bottles and maintained in a cool and dark environment prior to submission to ALS (Mary River On-Site Laboratory, NU). On the same day of collection, the laboratory filtered the samples through a 0.45 micron cellulose acetate membrane filter assisted by vacuum pump. Following filtration, the membrane filter was wrapped in aluminum foil, inserted into a labelled envelope, and then frozen. At the completion of field collections for the seasonal sampling event, the filters were shipped frozen to the ALS Waterloo, ON laboratory for chlorophyll *a* analysis using standard methods. The field QA/QC applied during chlorophyll *a* sampling was similar to that described for water chemistry sampling (see Section 2.1.2).

The CREMP study design also stipulates the collection of phytoplankton community samples for archiving (NSC 2014, 2015a). In the event that water quality, chlorophyll *a* and/or other biological components indicate potential mine-related effects to primary productivity at any of the mine-exposed water bodies, these phytoplankton community samples may be processed to further investigate the nature of mine-related effects to phytoplankton biomass and community structure (i.e., taxonomic composition, richness, density). To date, none of the archived phytoplankton community samples have been processed (2006 – 2015). In 2016, phytoplankton community samples were collected using the same methods described in the CREMP (NSC 2014). As in the past, these samples were not processed, but were archived for potential future usage.

The analysis of aqueous chlorophyll *a* concentrations closely mirrored the approach used to evaluate the water quality data. Briefly, chlorophyll *a* concentrations were compared: i) between respective mine-exposed and reference areas; ii) spatially and seasonally at each mine-exposed waterbody; iii) to AEMP benchmarks; and, iv) to baseline data. Comparisons of chlorophyll *a* concentrations between the mine-exposed and reference areas were based on both qualitative and statistical approaches, the latter of which used the same parametric and/or non-parametric statistics, as appropriate, as described previously (Section 2.1). An AEMP benchmark chlorophyll *a* concentration of 3.7 µg/L was established for the Mary River Project (NSC 2014), and therefore the 2016 chlorophyll *a* concentration data were compared to this benchmark to assist with the determination of potential mine-related enrichment effects at water bodies influenced by mine operations. A mine-related effect on the productivity of a waterbody of interest was assessed as a chlorophyll a concentration above the AEMP benchmark, the representative reference area, and/or the respective waterbody baseline condition.

2.3.2 Benthic Invertebrate Community

The Mary River Project CREMP benthic invertebrate community (benthic) survey outlines a habitat-based approach for characterizing potential mine-related effects to benthic biota of lotic (river/stream) and lentic (lake) environments (NSC 2014). Lotic areas sampled for benthic invertebrates in 2016 included Camp Lake Tributaries 1 and 2 at historically established areas located upstream and downstream of the mine tote road, Sheardown Lake Tributaries 1, 9 and 12 near their respective outlets, and the Mary River upstream (two areas) and downstream (three areas) of the mine site (Table 2.5; Figure 2.4), all of which had been sampled as part of the 2015 CREMP. In addition to these mine-exposed areas, a benthic area was established at upper Camp Lake Tributary 1 in 2016 (CLT1-L2; Table 2.5) to evaluate potential effects of elevated concentrations of mine-related parameters of concern that were shown within this portion of the tributary in the previous 2015 study (Minnow 2016). As well, a reference creek benthic study area located within at the same unnamed tributary to Angajurjualuk Lake that is used for reference water quality sampling (Stations CLT-REF4 and MRY-REF2) was added to

Table 2.5: Mary River Project CREMP stream benthic invertebrate community monitoring station coordinates for the 2016 study.

Lake System	Waterbody	Station Code	Station Type	UTM Zone 17W, NAD83	
				Easting	Northing
Angajurjualuk Lake	Unnamed Tributary	REF-CRK-B1	Reference	570069	7906132
		REF-CRK-B2	Reference	570107	7906119
		REF-CRK-B3	Reference	570135	7906103
		REF-CRK-B4	Reference	570145	7906088
		REF-CRK-B5	Reference	570148	7906078
Camp Lake	Camp Lake Tributary 1	CLT1-US-B1	Reference	558500	7914976
		CLT1-US-B2	Reference	558492	7914947
		CLT1-US-B3	Reference	558497	7914935
		CLT1-US-B4	Reference	558508	7914918
		CLT1-US-B5	Reference	558518	7914901
		CLT1-L2-B1	Mine-Exposed	558670	7914727
		CLT1-L2-B2	Mine-Exposed	558663	7914736
		CLT1-L2-B3	Mine-Exposed	558658	7914741
		CLT1-L2-B4	Mine-Exposed	558642	7914752
		CLT1-L2-B5	Mine-Exposed	558612	7914777
		CLT1-DS-B1	Mine-Exposed	557643	7914882
		CLT1-DS-B2	Mine-Exposed	557646	7914890
		CLT1-DS-B3	Mine-Exposed	557653	7914896
		CLT1-DS-B4	Mine-Exposed	557656	7914907
		CLT1-DS-B5	Mine-Exposed	557670	7914913
	Camp Lake Tributary 2	CLT2-US-B1	Reference	557444	7915234
		CLT2-US-B2	Reference	557464	7915253
		CLT2-US-B3	Reference	557454	7915278
		CLT2-US-B4	Reference	557449	7915290
		CLT2-US-B5	Reference	557453	7915313
		CLT2-DS-B1	Mine-Exposed	557372	7914958
		CLT2-DS-B2	Mine-Exposed	557374	7914970
		CLT2-DS-B3	Mine-Exposed	557381	7914990
		CLT2-DS-B4	Mine-Exposed	557395	7914999
		CLT2-DS-B5	Mine-Exposed	557402	7915018
Sheardown Lake Northwest (NW)	Sheardown Lake Tributary 1 (Reach 1)	SDLT1-R1-B1	Mine-Exposed	560352	7913537
		SDLT1-R1-B2	Mine-Exposed	560337	7913518
		SDLT1-R1-B3	Mine-Exposed	560330	7913502
		SDLT1-R1-B4	Mine-Exposed	560322	7913497
		SDLT1-R1-B5	Mine-Exposed	560318	7913493
	Sheardown Lake Tributary 12	SDLT12-B1	Mine-Exposed	560990	7912979
		SDLT12-B2	Mine-Exposed	560980	7912981
		SDLT12-B3	Mine-Exposed	560951	7912986
Sheardown Lake Southwest (SE)	Sheardown Lake Tributary 9	SDLT9-DS-B1	Mine-Exposed	561842	7911855
		SDLT9-DS-B2	Mine-Exposed	561813	7911827
		SDLT9-DS-B3	Mine-Exposed	561798	7911824
		SDLT9-DS-B4	Mine-Exposed	561785	7911816
		SDLT9-DS-B5	Mine-Exposed	561756	7911809
Mary Lake	Mary River	GO-09-B1	Reference	571450	7916984
		GO-09-B2	Reference	571468	7916966
		GO-09-B3	Reference	571491	7916924
		GO-09-B4	Reference	571499	7916889
		GO-09-B5	Reference	571502	7916847
		GO-03-B1	Mine-Exposed	566506	7912613
		GO-03-B2	Mine-Exposed	566508	7912617
		GO-03-B3	Mine-Exposed	566501	7912610
		GO-03-B4	Mine-Exposed	566490	7912603
		GO-03-B5	Mine-Exposed	566477	7912600
		EO-01-B1	Mine-Exposed	562891	7912193
		EO-01-B2	Mine-Exposed	562851	7912177
		EO-01-B3	Mine-Exposed	562791	7912169
		EO-01-B4	Mine-Exposed	562743	7912156
		EO-01-B5	Mine-Exposed	562718	7912156
		EO-20-B1	Mine-Exposed	561900	7911465
		EO-20-B2	Mine-Exposed	561866	7911446
		EO-20-B3	Mine-Exposed	561857	7911413
		EO-20-B4	Mine-Exposed	561844	7911393
		EO-20-B5	Mine-Exposed	561819	7911391
		CO-05-B1	Mine-Exposed	558466	7909205
		CO-05-B2	Mine-Exposed	558412	7909185
		CO-05-B3	Mine-Exposed	558410	7909248
		CO-05-B4	Mine-Exposed	558397	7909234
		CO-05-B5	Mine-Exposed	558357	7909220

the CREMP in 2016 (Table 2.5; Figure 2.4). This reference creek is referred to as Unnamed Reference Creek herein for the purposes of the 2016 CREMP. Consistent with the federal Environmental Effects Monitoring (EEM) program (Environment Canada 2012), five stations were sampled at each lotic study area with the exception of Sheardown Lake Tributary 12, where only three stations were sampled due to limited habitat available for sampling using conventional gear suitable for erosional habitat. As in 2015, the level of replication used for lotic benthic sampling in 2016 was greater than specified under the original CREMP design in order to provide consistency with EEM standards (Minnow 2016a). To the extent possible, previously established lotic benthic stations were incorporated into the 2016 sampling program to provide comparability to historical baseline information.

The lake benthic study approach outlined in the original Mary River Project CREMP focussed on habitat-based characterization of the community at each mine-exposed lake (Baffinland 2014; NSC 2014, 2015a). In 2016, the lake benthic monitoring approach was modified to reflect an effects-based design consistent with that recommended for mines under the national EEM program (Environment Canada 2012). In addition, the 2016 study instituted harmonized sediment quality and benthic sampling at each lake benthic station to potentially improve the ability of the study to evaluate sediment physical feature and/or metal concentration influences on the benthic invertebrate community. Under the modified 2016 design, lake benthic sampling targeted littoral habitat (i.e., water depths ranging from approximately 7 m to 12 m) with substrate composed predominantly of fine sand- to silt-sized particles at each mine-exposed and reference study lake. Analysis of benthic data collected at Reference Lake 3 in 2015 indicated that, similar to temperate lakes (Ward 1992), depth-related influences on benthic invertebrate community structure (e.g., density and richness) occurs naturally in lakes of the Baffinland region (Minnow 2016a). Additional sampling conducted at Reference Lake 3 in 2016 confirmed the occurrence of natural depth-related influences on benthic invertebrate community structure in area lakes (Appendix B). Because the occurrence of naturally lower density and richness with greater depth (i.e., profundal habitat) potentially limits the ability of the AEMP study to identify mine-related effects at area lakes, littoral habitat was preferred for CREMP lake benthic sampling. Five littoral stations were sampled at each study lake which, to the extent possible, included previously established CREMP benthic stations to provide temporal continuity (Table 2.4; Figure 2.4).

2.3.2.1 Sample Collection and Laboratory Analysis

Two types of sampling equipment and methods were employed during the 2016 CREMP benthic survey to reflect different habitat types as follows:

- at **lotic (stream/river) stations** (i.e., predominantly cobble and/or gravel substrate in flowing waters), benthic samples were collected using a Surber sampler (0.0929 m^2 sampling area) outfitted with 500-µm mesh. At each erosional station, one sample representing a composite of three Surber sampler grabs (i.e., 0.279 m^2 area) was collected to ensure that each sample was representative of habitat conditions. A concerted effort was made to ensure that water velocity and substrate characteristics were comparable among respective lotic study area stations to minimize natural influences on community variability. Once all three sub-samples were collected at each respective station, all material gathered in the Surber sampler net was transferred to a plastic sampling jar to which both external and internal station identification labels were affixed.
- at **lentic (lake) stations** (i.e., predominantly soft silt-sand, silt and/or clay substrates with variable amounts of organics), benthic sampling was conducted using a petite-Ponar grab sampler (15.24 x 15.24 cm; 0.023 m^2 sampling area). A single sample, consisting of a composite of five grabs (i.e., 0.115 m^2 sampling area) was collected at each station with care taken to ensure that each grab was acceptable (i.e., that the grab captured sufficient surface material and was full to each edge). Any incomplete grabs were discarded. For each acceptable grab, the petite-Ponar was thoroughly rinsed and the material then field-sieved through 500-µm mesh. Following sieving of all five grabs, the retained material was carefully transferred into a plastic sampling jar to which both external and internal station identification labels were affixed.

Following collection, the benthic samples were preserved to a level of 10% buffered formalin in ambient water. Supporting measurements and information collected at each replicate grab location for lotic stations included sampling depth, water velocity, substrate size, an estimate of substrate embeddedness and description of macrophyte/algae presence. In addition, *in-situ* water quality at the bottom of the water column and collection/recording of global positioning system (GPS) coordinates was conducted at each lotic benthic station. Supporting information recorded at each lake benthic station included substrate description, presence of aquatic macrophytes/algae, sampling depth, *in-situ* water quality measurements near the water column surface and bottom, and GPS coordinates. All GPS coordinates were collected in Universal Transverse Mercator (UTM) units using a hand-held portable Garmin GPS72 (Garmin International Inc., Olathe, KS) device based on 1983 North America Datum (NAD 83).

Benthic samples were submitted to and processed by Zeas Inc. (Nobleton, ON) using standard sorting methods. Upon arrival at the laboratory, a biological stain was added to each benthic sample to facilitate greater sorting accuracy. The samples were washed free of formalin in a

500 µm sieve and the remaining sample material was then examined under a stereomicroscope at a magnification of at least ten times by a technician. All benthic invertebrates were removed from the sample debris and placed into vials containing 70% ethanol according to major taxonomic groups (i.e., order or family levels). A senior taxonomist later enumerated and identified the benthic organisms to the lowest practical level (typically genus or species) utilizing up-to-date taxonomic keys. Quality assurance/quality control (QA/QC) conducted during the laboratory processing of benthic samples included organism recovery and sub-sampling checks on as many as 10% of the total samples collected for the 2016 CREMP (Appendix A).

2.3.2.2 Data Analysis

Benthic data were evaluated separately for lotic and lentic habitat data sets. Benthic invertebrate communities were evaluated using summary metrics of mean invertebrate abundance (or "density"; average number of organisms per m^2), mean taxonomic richness (number of taxa, as identified to lowest practical level), Simpson's Evenness Index (E) and the Bray-Curtis Index of Dissimilarity. Simpson's Evenness was calculated using the Krebs method (Smith and Wilson 1996) and Bray-Curtis Index was calculated using the formula presented in Environment Canada (2012). Additional comparisons were conducted using percent composition of dominant/indicator taxa, functional feeding groups, and habitat preference groups (calculated as the abundance of each respective group relative to the total number of organisms in the sample). Dominant/indicator taxonomic groups were defined as those groups representing, on average, greater than 5% of total organism abundance for a study area or any groups considered important indicators of environmental stress. Functional feeding groups (FFG) and habitat preference groups (HPG) were assigned based on Pennak (1989), Mandaville (2002) and/or Merritt et al. (2008) descriptions/designations for each taxon.

Statistical comparisons of all applicable benthic invertebrate community indices and community composition endpoints were conducted using the same tests, transformations[1], assumptions and software described for the *in-situ* water quality comparisons (see Section 2.1.2). An effect on benthic invertebrate communities was defined as a statistically significant difference between any paired mine-exposed and reference areas at a p-value of 0.10. For each endpoint showing a significant difference, the magnitude of difference was calculated between study area means. Because the benthic survey was designed to have sufficient power to detect a difference (effect size) of ± two standard deviations (SD), the

[1] Rather than log-transformations like those conducted for non-normal *in-situ* water quality data, non-normal dependent proportional benthic data were subject to a modified probit transformation that better accounted for nil (or near-zero) values in the statistical analysis.

magnitude of the difference was calculated to reflect the number of reference mean standard deviations (SD_{REF}) using equations provided by Environment Canada (2012). A Critical Effect Size for the benthic invertebrate community study (CES_{BIC}) of $\pm$ 2 SD_{REF} was used to define any ecologically relevant 'effects', which is analogous to differences beyond those expected to occur naturally between two areas that are uninfluenced by anthropogenic inputs (i.e., between pristine reference areas; see Munkittrick et al. 2009, Environment Canada 2012).

Temporal comparisons included statistical evaluations among the baseline, 2015 and 2016 data for primary benthic metrics (i.e., density, richness, Simpson's Evenness) and dominant invertebrate groups and FFG using uni-variate tests (e.g., ANOVA) and pair-wise *post-hoc* tests. The temporal statistical comparisons were conducted using the same tests, transformations, assumptions and software described above for the *in-situ* water quality comparisons (see Section 2.1.1). For study areas that contained data for multiple years (i.e., 3 or more), Tukey's HSD *post-hoc* tests were used in instances in which normal data showed equal variance, and Tamhane's *post-hoc* tests were used in instances in which normal data showed unequal variance. Similar to the 2016 within-year statistical analyses, the magnitude of difference was calculated for endpoints that differed significantly between years in the *post-hoc* tests and compared to the benthic survey CES_{BIC} of within two standard deviations of the baseline year mean (abbreviated as ±2 $SD_{BL\text{-}year}$).

2.3.3 Fish Population

The Mary River Project CREMP fish population survey outlines a non-lethal sampling design to evaluate potential mine-related effects to the fish population (e.g., age structure, growth, condition) at the mine-exposed lakes (NSC 2014, 2015a). The fish population survey targeted Arctic charr (*Salvelinus alpinus*) primarily because this species is the only abundant fish common to the mine's regional lakes, sufficient baseline catch and measurement data is available for this species to allow application of a before-after statistical evaluation, and because of this species importance as an Inuit subsistence food source. The approach employed for the CREMP fish population survey closely mirrored the recommended EEM approach for non-lethal sampling (Environment Canada 2012). Specifically, the 2016 fish population survey targeted the collection of approximately 100 Arctic charr from nearshore lake habitat and 100 Arctic charr from littoral/profundal lake habitat. The four mine-exposed study lakes used for the fish population survey were the same as those used to document baseline conditions, namely Camp, Sheardown NW, Sheardown SE and Mary lakes (Figure 2.1). Although the 2016 study also targeted Arctic charr from Reference Lake 3 as a basis for the evaluation of potential mine-related influences to the fish population, similar to the 2015 CREMP study, low numbers of Arctic charr were captured from the littoral/profundal zone of the reference lake in 2016. Thus, the 2016 fish population survey focussed on comparisons of fish collected at the nearshore of the mine-exposed and reference lakes, as well as on comparisons of fish captured at nearshore and littoral/profundal zones of individual mine-exposed lakes before-and-after the commencement of the Mary River Project ERP mine operations.

2.3.3.1 Sample Collection

Nearshore areas of the study lakes were sampled for Arctic charr using a battery powered backpack electrofishing unit (Model LR-24, Smith-Root Inc., Vancouver, WA). An electrofishing team, consisting of the backpack electrofisher operator and a single netter, conducted a single fishing pass at one to three shoreline reaches of each study lake. The number of passes conducted at each study lake was dependent upon catch success, with more passes required in instances in which target numbers were not cumulatively attained. All fish captured during each pass were retained in buckets of aerated water. At the conclusion of each pass, total fishing effort (i.e., electrofishing seconds) was recorded to allow calculation of time-standardized catch. All captured fish were identified to species and enumerated, with any non-target species subsequently released alive at the area of capture. All captured Arctic charr were temporarily retained for processing using methods described below (Section 2.3.3.2). Additional supporting information collected for each electrofishing pass included recording the GPS coordinates at the points of commencement and completion of electrofishing activities, and a description of the sampled habitat.

Littoral/profundal areas of the study lakes were sampled for Arctic charr using experimental (gang index) gill nets. Multiple-panel, 2 m high gill nets with total lengths ranging from 61 – 91 m (200’ – 300’) and bar mesh sizes ranging from 38 – 76 mm (1.5” – 3”) were set on the bottom for short durations (approximately 0.6 – 5.7 hours per set; mean 2.5 hours) during daylight hours only. Upon retrieval of each net, all captured fish were identified to species, enumerated and processed (see below) separately for each individual gill net panel mesh size. For each gill net set, information including mesh size, duration of sampling, sampling depth range, GPS coordinates and habitat descriptions were recorded.

2.3.3.2 Field and Laboratory Processing

Following completion of each electrofishing pass and retrieval of each individual gill net panel, all captured Arctic charr were subject to processing in the field. For all live captures, the external condition of each individual was assessed visually for the presence of any deformities, erosions, lesions and tumors (DELT) or evidence of external and/or internal parasites. All observations were recorded on field sheets, with supporting photographs taken as appropriate.

Each fish was then subject to measurement of fork and total length to the nearest millimetre using a standard measuring board. Following length measurements, fish captured using the electrofishing unit were individually weighed to the nearest milligram using an Ohaus Model 123 Scout-Pro analytical balance (Ohaus Corp., Pine Brook, NJ) with a surrounding draft shield. For Arctic charr captured in gill nets, individuals were weighed using Pesola™ spring scales (Pesola AG, Baar Switzerland) demarcated at intervals of 1-2% of the total scale range and with precision of ± 0.3%. The Pesola™ spring scale for individual weight measurement of gill-net captured fish was selected so that the fish weight was near the top of the scale's range to ensure that measurements achieved a resolution near 1%. All live Arctic charr captured by electrofishing and gill netting methods that were not selected for the collection of aging structures were released near the location of capture following these individual measurements of length and weight.

As specified for EEM non-lethal fish population surveys (see Environment Canada 2012), approximately 10% of the targeted number of Arctic charr captured using electrofishing methods were sacrificed for collection of aging structures. Arctic charr mortalities from experimental gill netting were approximately 20% of targeted catch numbers, and therefore aging structures were removed from each incidental mortality. Otoliths and pectoral fin rays were removed from all sacrificed individuals and incidental mortalities. Upon removal, these aging structures were wrapped separately in wax paper, placed inside envelopes labelled with the fish identification, and then dried for storage. For all incidental mortalities, in addition to removal of aging structures, fish were dissected to determine sex and for removal of the liver and whole gonads for weight measurement. These organs were weighed to the nearest milligram using an Ohaus Model 123 Scout-Pro balance outfitted with a surrounding draft shield. During processing, fish were also inspected for any internal abnormalities (e.g., parasites, lesions, tumours, etc.) with descriptions recorded accordingly.

Age structures (otoliths and pectoral fin rays) were shipped to North Shore Environmental Services (NSES; Thunder Bay, ON) for age determination. At the laboratory, otoliths were prepared for aging using a "crack and burn" method. Pectoral fin rays were cleaned, embedded in epoxy resin and, after the epoxy hardened, sectioned transversely using a Buehler Isomet (Lake Bluff, IL) low-speed diamond saw. The prepared otolith and pectoral fin ray samples were later mounted on a glass slide using a mounting medium and examined under a compound microscope using transmitted light to determine fish age. For each structure, the age and edge condition was recorded along with a confidence rating for the age determination.

2.3.3.3 Data Analysis

Fish community data from the mine-exposed and reference study areas were compared based on total catch and catch-per-unit-effort (CPUE) for each sampling method. Electrofishing CPUE was calculated as the number of fish captured per electrofishing minute, and gill netting CPUE was calculated as the number of fish captured per 100 meter·hours of net used for each study lake. Temporal comparison of fish community assemblage was conducted using electrofishing CPUE and gill netting CPUE to evaluate relative changes in fish catches at mine area lakes between mine baseline and the 2016 year of mine operation.

Arctic charr population health was assessed separately for electrofishing and experimental gill netting data sets. Initial data analysis for the non-lethal survey included the plotting of length frequency distributions as described by Bonar (2002) and Gray et al. (2002), so that, together with appropriate aging data, YOY individuals could be distinguished from the juvenile/adult life stages (electrofishing data set), or various size/age classes could be distinguished from one another (gill netting data set). Where relevant, the YOY age class was assessed separately from the juvenile/adult age classes for fish survey endpoints between the individual mine-exposed lakes and the reference lake. Fish size endpoints of fork length and fresh body weight were summarized by separately reporting mean, median, minimum, maximum, standard deviation, standard error and sample size by size class (if possible) for each study area. The recorded measurement endpoints were used as the basis for evaluating four response categories (survival, growth, reproduction and energy storage; Table 2.6) according to the procedures outlined by Environment Canada (2012) for environmental effects monitoring. Length-frequency distribution was compared between mine-exposed and reference areas, for data collected in 2016, and for before-after analysis using data collected in 2016 and during the combined baseline period, using a non-parametric two-sample Kolmogorov-Smirnov (KS) test. Mean fork length and body weight were compared between mine-exposed and reference study areas in 2016, and between 2016 and the mine baseline period, using ANOVA, with data inspected for normality and homogeneity of variance before applying parametric statistical procedures. In cases where data did not meet the assumptions of ANOVA despite log-transformation, a non-parametric Mann-Whitney U-test was also performed to test for/validate significant differences between study areas or study periods, as appropriate, indicated by the ANOVA test.

Body weight at fork length (condition) was compared using Analysis-of-Covariance (ANCOVA). Prior to conducting the ANCOVA tests, scatter plots of all variable and covariate combinations were examined to identify outliers, leverage values or other unusual data. The scatter plots were also examined to ensure there was adequate overlap between the 2016 mine-exposed

Table 2.6: Fish population survey endpoints examined for the Mary River Project CREMP, August 2016.

Response Category	Endpoint	Statistical Procedure[c,d,e]	Critical Effect Size
Survival	Length-frequency distribution[a]	K-S Test	not applicable
	Age[a,f]	ANOVA	not applicable
Energy Use (size)	Size (fresh body weight)[b]	ANOVA	25%
	Size (fork length)[b]	ANOVA	25%
Energy Use (growth)	Size-at-age (body weight against age)[a,f]	ANCOVA	25%
	Size-at-age (fork length against age)[b,f]	ANCOVA	25%
Energy Use (reproduction)	Relative abundance of YOY (% composition)[b]	None	not applicable
Energy Storage	Condition (body weight against length)[a]	ANCOVA	10%

[a] Endpoints used for determining "effects" as designated by statistically significant difference between mine-exposed and reference areas (Environment Canada 2012).

[b] These analyses are for informational purposes and significant differences between exposure and reference areas are not necessarily used to designate an effect (Environment Canada 2012).

[c] ANOVA (Analysis of Variance) used except for non-normal data, where Mann Whitney U-test may have been used.

[d] ANCOVA (Analysis of Covariance). For the ANCOVA analyses, the first term in parentheses is the endpoint (dependent variable Y) that is analyzed for an effluent effect. The second term in parentheses is the covariate, X (age, weight, or length).

[e] K-S Test (Kolmogorov-Smirnov test).

[f] Endpoints which were applied to reduced data sets, including sacrificed fish and/or mortalities.

and reference/mine-exposed baseline data sets, and that there was a linear relationship between the variable and the covariate. In order to verify the existence of a linear relationship, each relationship was tested using linear regression analysis by area and evaluated at an alpha level of 0.05. If it was determined that there was no significant linear regression relationship between the variable and covariate for the 2016 mine-exposed and/or reference/ mine-exposed baseline data sets, then the ANCOVA was not performed. Once it was determined that ANCOVA could be used for statistical analysis of the data, the first step in the ANCOVA analysis was to test whether the slopes of the regression lines for the 2016 mine-exposed and reference/baseline data sets were equal. This was accomplished by including an interaction term (dependent × covariate) in the ANCOVA model and evaluating if the interaction term was significantly different, in which case the regression slopes would not be equal between data sets and the resulting ANCOVA would provide spurious results. In such cases, two methodologies were employed to assess whether a full ANCOVA could proceed. In order of preference these were: 1) removal of influential points using Cook's distance and re-assessment of equality of slopes; and, 2) Coefficients of Determination that considered slopes equal regardless of an interaction effect (Environment Canada 2012). For the Coefficients of Determination, the full ANCOVA was completed to test for main effects, and if the r^2 value of both the parallel regression model (interaction term) and full regression model were greater than 0.8 and within 0.02 units in value, the full ANCOVA model was considered valid (Environment Canada 2012). If both methods proved unacceptable, the magnitude of effect was estimated at both the minimum and maximum overlap of covariate variables between areas (Environment Canada 2012). This results in a statistically significant interaction effect (slopes are not equal), but the calculation of the magnitude of difference at the minimum and maximum values of covariate overlap is not assigned statistical difference as it would for a full ANCOVA model. If the interaction term was not significant (i.e., homogeneous slopes between the two populations), then the full ANCOVA model was run without the interaction term to test for differences in adjusted means between the two data sets. The adjusted mean was then used as an estimate of the population mean based on the value of the covariate in the ANCOVA model.

For endpoints showing significant data set differences, the magnitude of difference between 2016 mine-exposed and reference data or the baseline data was calculated as described by Environment Canada (2012) using mean (ANOVA), adjusted mean (ANCOVA with no significant interaction) or predicted values (ANCOVA with significant interaction). The anti-log of the mean, adjusted mean, or predicted value was used in the equations for endpoints that were log_{10}-transformed. In addition, the magnitude of difference for ANCOVA with a significant interaction was calculated for each of the minimum and maximum values of the covariate.

If there was no significant difference indicated between data sets, the minimum detectable effect size was calculated as a percent difference from the reference mean/mine-exposed baseline mean for ANOVA or adjusted reference mean/mine-exposed baseline mean for ANCOVA at alpha = beta = 0.10 using the square root of the mean square error (generated during either the ANOVA or ANCOVA procedures) as a measure of variability in the sample population based on formula provided by Environment Canada (2012). Finally, if outliers or leverage values were observed in a data set (or sets) upon examination of scatter plots and residuals, then the values were removed and ANOVA or ANCOVA tests were repeated and presented only for the reduced data sets.

3.0 CAMP LAKE SYSTEM

3.1 Camp Lake Tributaries (CLT)

3.1.1 Water Quality

3.1.1.1 Camp Lake Tributary 1

Camp Lake Tributary 1 (CLT1) dissolved oxygen (DO) concentrations were consistently at or above saturation at all north branch and main stem stations during all spring, summer and fall monitoring events (Appendix Tables C.1 – C.3). Dissolved oxygen concentrations and percent saturation at the CLT1 north branch and upper and lower main stem stations (downstream of QMR2 Quarry and mine-tote road, respectively) differed significantly among each other and compared to the reference creek at the time of biological sampling in August 2016 (Figure 3.1; Appendix Table C.13). However, DO saturation was well above the WQG minimum limit for cold-water biota (i.e., 54%) at all stations (Figure 3.1), suggesting that these differences were not likely to be ecologically meaningful, and that mine activity had not adversely affected DO concentrations at CLT1. No consistent spatial patterns in *in-situ* pH were shown with distance from the mine during all spring, summer and fall monitoring events within the CLT1 system (Appendix Tables C.1 – C.3). Although pH was significantly higher at all CLT1 stations compared to Unnamed Reference Creek, no significant differences in pH were indicated among the north branch and main stem study areas in August 2016 (Figure 3.1). In addition, pH at CLT1 was similar to other lotic reference stations and was consistently within WQG limits, suggesting that pH differences at CLT1 compared to Unnamed Reference Creek reflected natural variation in pH among regional creeks, and that mine activity had not adversely affected pH within the CLT1 system.

Water chemistry of the CLT1 north branch was similar to the reference creek stations with the exception of a slightly higher (i.e., 3- to 5-fold) nitrate concentration during the summer sampling event in 2016 (Table 3.1; Appendix Table C.14). *In-situ* specific conductance was significantly higher at the CLT1 stations compared to Unnamed Reference Creek, and differed significantly among the north branch and upper and lower main stem study areas during the August 2016 sampling event (Figure 3.1) suggesting a mine-related influence on water quality of the CLT1 system. In addition to conductivity and nitrate concentrations, hardness, alkalinity and concentrations of total dissolved solids (TDS), ammonia, total Kjeldahl nitrogen (TKN), organic carbon, chloride, sulphate and several metals, including cobalt, iron, manganese, molybdenum, potassium, sodium, strontium and uranium, were slightly to highly elevated (i.e., 3-fold to ≥10-fold higher, respectively) at the upstream-most CLT1 main stem station (L2-03)

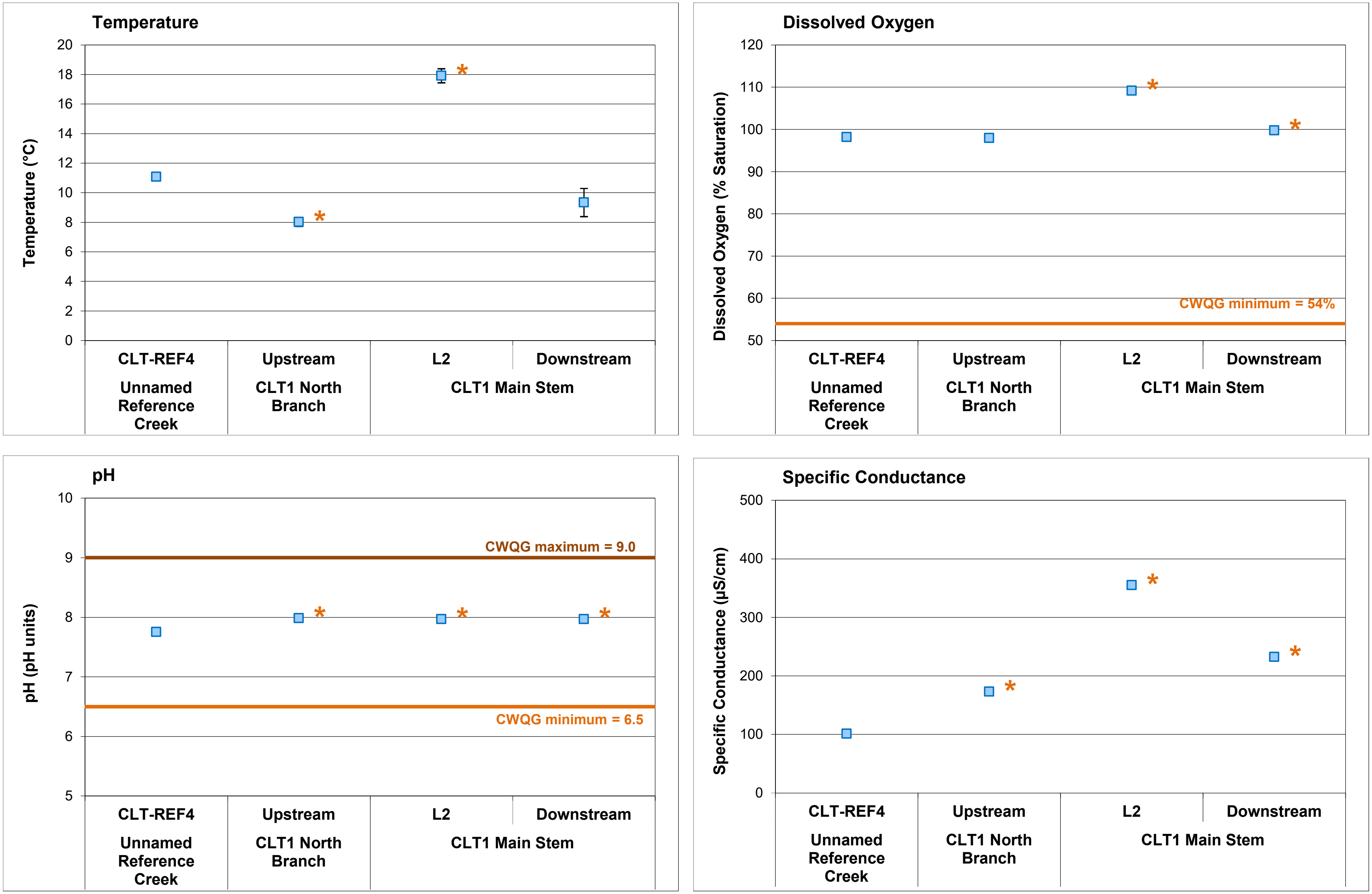

Figure 3.1: Comparison of *in-situ* water quality variables (mean ± SD; n = 5) measured at Camp Lake Tributary 1 benthic invertebrate community stations, Mary River Project CREMP, August 2016. An asterisk (*) next to data point indicates mean value differs significantly from the Unnamed Reference Creek mean.

Table 3.1: Water chemistry at Camp Lake Tributary (CLT) monitoring stations during fall (August) sampling, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Reference Creek Average (n=4)	North Branch CLT1		Main Stem CLT1				CLT-2
						L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					Fall 2016	20-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016
Conventionals[b]	Conductivity (lab)	umho/cm	-	-	125	147	209	431	293	298	296	255
	pH (lab)	pH	6.5 - 9.0	-	7.99	7.97	8.21	7.99	8.16	8.11	8.17	8.27
	Hardness (as $CaCO_3$)	mg/L	-	-	57.75	72	105	176	136	138	138	130
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	65	77	94	230	156	159	143	123
	Turbidity	NTU	-	-	1.10	0.34	0.26	2.88	0.97	0.93	0.95	0.29
	Alkalinity (as $CaCO_3$)	mg/L	-	-	57	72	104	140	119	116	116	125
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	0.237	0.048	0.047	0.042	0.031
	Nitrate	mg/L	13	13	0.021	0.079	<0.020	1.67	0.353	0.411	0.380	0.048
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	0.0203	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	0.56	0.20	0.24	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.3	1.8	2.4	4.6	3.0	3.0	2.9	3.0
	Total Organic Carbon	mg/L	-	-	1.5	1.9	2.6	4.6	3.2	3.4	3.1	3.2
	Total Phosphorus	mg/L	0.020[α]	-	0.0059	0.0087	<0.0030	0.0096	0.0033	0.0059	0.0031	0.0108
	Phenols	mg/L	0.004[α]	-	0.0055	0.0070	0.0067	0.0076	0.0041	0.0038	0.0025	0.0067
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.4975	1.91	2.13	36.7	18.4	18.9	17.2	5.11
	Sulphate (SO_4)	mg/L	218[β]	218	4.39	2.98	4.83	18.4	7.84	8.25	7.70	5.29
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0578	0.0137	0.0071	0.031	0.0098	0.0110	0.0154	0.0080
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00779	0.0109	0.0128	0.0168	0.0163	0.0155	0.0157	0.0142
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00040	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.0003875	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	0.020	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	12.3	14.2	20.3	34.3	28.3	27.9	28.8	25.2
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	0.00034	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.0010	***0.00228***	***0.00226***	0.0013	0.00194	0.00191	0.00183	0.00156
	Iron (Fe)	mg/L	0.30	0.326	0.051	<0.030	<0.030	***0.459***	0.120	0.112	0.094	<0.030
	Lead (Pb)	mg/L	0.001	0.001	0.000096	<0.000050	<0.000050	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.0013	0.0031	0.0037	0.0036	0.0034	0.0016
	Magnesium (Mg)	mg/L	-	-	6.77	8.69	12.9	21.0	15.7	15.9	15.8	15.7
	Manganese (Mn)	mg/L	0.935[β]	-	0.00086	0.000651	0.000694	0.0511	0.0108	0.00822	0.00535	0.00104
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000380	0.000851	0.000647	0.00353	0.00120	0.00115	0.000988	0.000436
	Nickel (Ni)	mg/L	0.025	0.025	0.00056	<0.00050	0.00071	0.00146	0.00103	0.00102	0.00101	0.00066
	Potassium (K)	mg/L	-	-	0.84	2.15	2.05	3.30	2.41	2.35	2.28	1.79
	Selenium (Se)	mg/L	0.001	-	<0.0007625	<0.0010	<0.0010	0.000118	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.95	0.83	1.10	1.22	1.21	1.26	1.30	1.05
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000020	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.830	0.584	1.55	16.3	5.32	5.37	5.10	2.80
	Strontium (Sr)	mg/L	-	-	0.01240	0.00826	0.0106	0.0415	0.0487	0.0460	0.0401	0.0151
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.0000775	<0.00010	<0.00010	0.000010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00799	<0.010	<0.010	0.00115	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00366	0.00399	0.00277	0.0172	0.00580	0.00571	0.00501	0.00236
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.000875	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0082

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake tributary system.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

compared to average reference creek station water chemistry at the time of the August 2016 sampling event (Table 3.1; Appendix Tables C.14 and C.16). However, on average, only concentrations of nitrate, chloride, manganese and strontium were elevated at the CLT1 lower main stem (i.e., stations L1-09, L1-05 and L0-01) compared to respective reference creek station average concentrations during the fall sampling event (Appendix Table C.14), reflecting natural dilution of the main stem from the north branch. Similar to the 2015 data, the spatial patterns in the 2016 water quality data suggested a mine-related influence within the CLT1 main stem, whereas at the north branch, only a slight mine-related influence on water quality was evident. Despite evidence of continued mine-related influence on water quality of the CLT1 system, concentrations of all parameters were below applicable WQG and watercourse-specific AEMP benchmarks at CLT1 with the exception of copper concentrations at the north branch, and iron and uranium concentrations at upstream-most Station L2-03 of the main stem[2] (Table 3.1).

Temporal comparisons of the CLT1 north branch water chemistry data indicated that parameter concentrations in fall 2016 were generally within the range of those measured during the mine baseline (2005 – 2013) period with the exception of higher copper concentrations in both 2015 and 2016 (Figure 3.2; Appendix Figure C.2). Temporal comparisons of CLT1 main stem water chemistry data indicated that, of the parameters shown to have elevated concentrations relative to the reference creek stations, hardness and concentrations of TDS, chloride and strontium in 2016 were comparable to or only slightly higher than concentrations during the mine baseline period (Figure 3.2; Appendix Figure C.2). However, conductivity, nitrate, sulphate, iron, manganese, molybdenum, sodium and uranium showed progressively higher concentrations from mine baseline, to construction, to 2015 and/or 2016 mine operational years at all four CLT1 main stem stations (Figure 3.2; Appendix Figure C.2). Higher concentrations of these parameters at the main stem CLT1 stations over time likely reflected greater blasting/excavating activity (including associated dust generation) at mine quarry QMR2, and potentially greater fugitive dust generation from increased truck usage on the mine tote road during mine activities from 2014 - 2016 compared to the baseline period. The QMR2 quarry is used to provide material for mine infrastructure projects (e.g., road construction).

[2] Although phenol concentrations were above WQG at the CLT1 tributaries, all mine lakes (including Camp, Sheardown NW, Sheardown SE and Mary) and Mary River, phenol concentrations were also above WQG at the reference creek stations, Mary River reference stations (i.e., GO-09 series stations) and Reference Lake 3, indicating natural elevation of phenol concentrations in regional water bodies unrelated to mine operations (see Appendix B for additional discussion). Because elevated aqueous phenol concentrations appeared to be a natural phenomenon, no discussion of phenol concentrations was included in comparisons to WQG for the mine-exposed waterbodies in the 2016 CREMP.

Figure 3.2: Temporal comparison of water chemistry at Camp Lake Tributary 1 (CLT-1) and Tributary 2 (CLT-2) for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during fall. Values represent mean ± SD. Reference creek stations include the CLT-REF and MRY-REF series (mean ± SD; n = 4). Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.3 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to the Camp Lake Tributaries.

3.1.1.2 Camp Lake Tributary 2 (CLT2)

Camp Lake Tributary 2 (CLT2) dissolved oxygen saturation levels were consistently high at Station KO-01 in 2016, and were similar to mean DO saturation observed among the reference creek stations (Appendix Tables C.1 – C.3). However, *in-situ* DO concentrations/saturation and pH at CLT2 differed significantly upstream and downstream of the mine tote road, and compared to Unnamed Reference Creek, at the time of biological sampling in August 2016 (Figure 3.3; Appendix Tables C.17). Despite these differences, DO saturation was well above the WQG minimum limit for cold-water biota (i.e., 54%) and pH was consistently within WQG limits at all CLT2 stations during all 2016 sampling events (Figure 3.3; Appendix Tables C.1 to C.3). Therefore, the differences in DO concentrations/saturation and pH between areas within the CLT2 system and at CLT2 compared to Unnamed Reference Creek were not likely to be ecologically meaningful, nor indicate an adverse mine-related influence.

Water chemistry at CLT2 (Station KO-01) was similar to the reference creek stations with the exceptions of slightly higher (i.e., 3- to 5-fold) sulphate and zinc concentrations during the spring and/or summer sampling events in 2016 (Table 3.1; Appendix Table C.14). *In-situ* specific conductance was significantly higher at CLT2 compared to the reference creek, but did not differ significantly upstream and downstream of the mine tote road during the August 2016 sampling event (Figure 3.3). However, aqueous concentrations of all parameters were consistently well below established WQG and AEMP benchmarks at the CLT2 monitoring station in 2016[3] (Table 3.1; Appendix Table C.14). Temporal comparisons of CLT2 water chemistry data indicated that parameter concentrations in fall 2016 were generally within the range of those measured during the mine baseline (2005 – 2013) period and not unlike those observed during the 2014 mine construction and 2015 mine operation periods (Figure 3.2; Appendix Figure C.2). Collectively, the 2016 water chemistry data suggested only minor mine influence on aqueous conductivity, sulphate and/or zinc concentrations within the CLT2 system in 2016.

3.1.2 Phytoplankton

3.1.2.1 Camp Lake Tributary 1 (CLT1)

Camp Lake Tributary 1 (CLT1) north branch chlorophyll a concentrations were lower than the average concentration among reference creek stations for spring, summer and fall seasons in 2016, but were within the overall range of reference creek chlorophyll a concentrations suggesting no marked differences in phytoplankton productivity between the CLT1 north

[3] Refer to Footnote 2 (page 23) and Appendix B regarding phenol concentrations above WQG at the mine-exposed and reference areas of the Mary River Project LSA waterbodies.

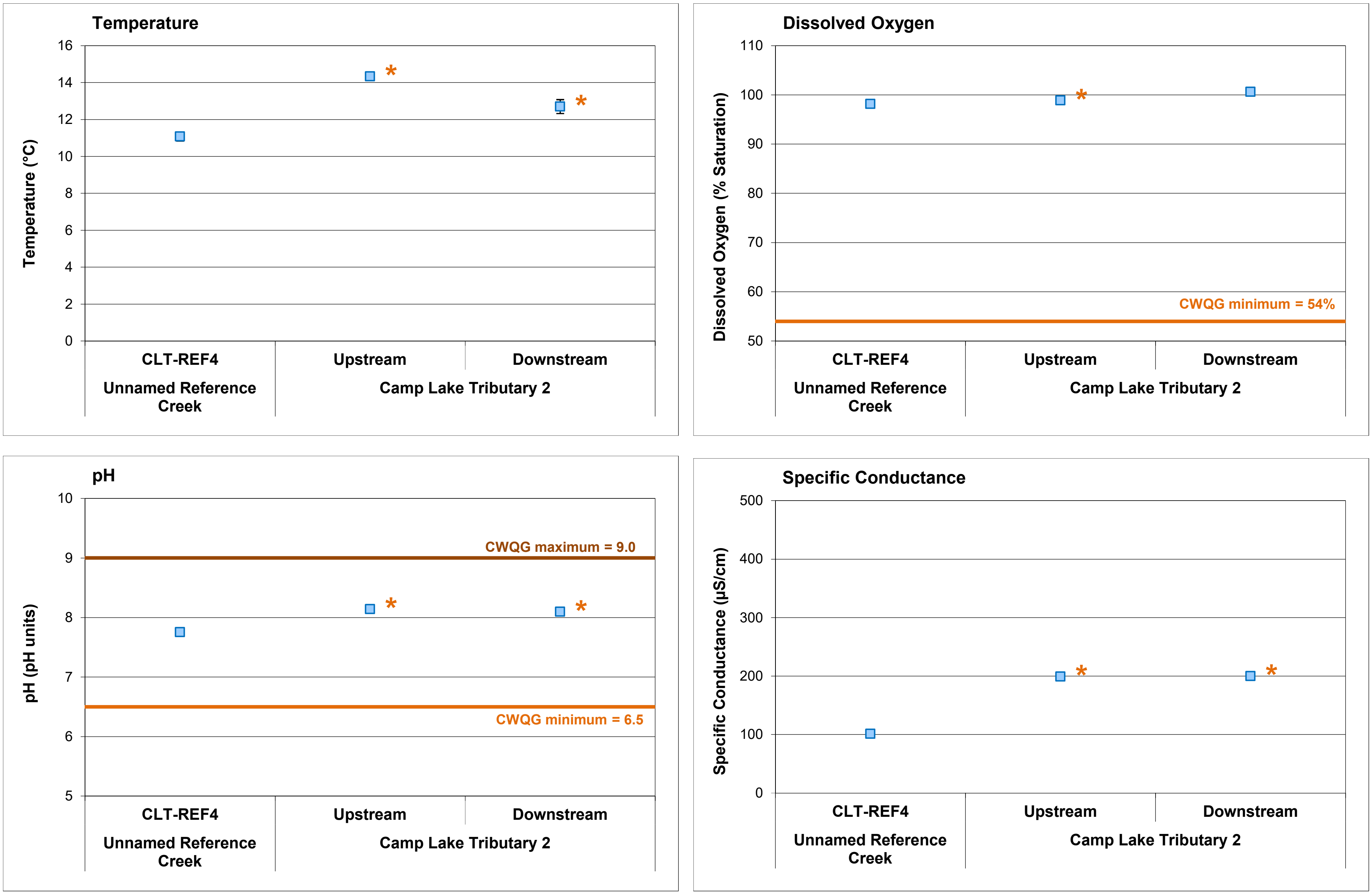

Figure 3.3: Comparison of *in-situ* water quality variables (mean ± SD; n = 5) measured at Camp Lake Tributary 2 benthic invertebrate community stations, Mary River Project CREMP, August 2016. An asterisk (*) next to data point indicates mean value differs significantly from the Unnamed Reference Creek mean.

branch and the reference creek stations (Figure 3.4). Within the CLT1 main stem, chlorophyll a concentrations were consistently highest at upstream-most Station L2-03, with concentrations at this station also consistently greater than at the reference creek stations in 2016. Downstream of the north branch confluence, beginning at Station L1-09, chlorophyll a concentrations were comparable to, or slightly greater than, those at the reference creek stations (Figure 3.4). Chlorophyll a concentrations at all CLT1 north branch and main stem monitoring stations were well below the AEMP benchmark of 3.7 µg/L for all seasonal sampling events in 2016 (Figure 3.4). Similar to the reference creek stations, chlorophyll a concentrations observed at all CLT1 stations in 2016 suggested low (i.e., oligotrophic) phytoplankton productivity based on Dodds et al (1998) trophic status classification for stream environments (i.e., chlorophyll a < 10 µg/L). This trophic status classification was also consistent with an ‘ultra-oligotrophic’ to ‘oligotrophic’ WQG categorization for CLT1 based on mean aqueous total phosphorus concentrations less than 10 µg/L during all spring, summer and fall sampling events (Table 3.1; Appendix Table C.14).

Temporal comparisons of the CLT1 chlorophyll a data indicated that concentrations at the north branch in 2015 and 2016 mine operation years were similar to, or lower than, those observed during the baseline (2005 – 2013) period (Figure 3.5). However, at the CLT1 main stem, chlorophyll a concentrations were generally higher in 2015/2016 than during the mine baseline period with the exception of at the CLT1 mouth (Station L0-01; Figure 3.5). The spatial and temporal analyses of chlorophyll a concentrations at CLT1 suggested that mine operation may have contributed to slightly higher phytoplankton productivity within the upper main stem (i.e., Station L2-03), but not at the north branch or at the lower main stem stations. As described in the 2015 CREMP, higher phytoplankton productivity within the CLT1 upper main stem was consistent with the occurrence of elevated aqueous nutrient (e.g., ammonia, nitrate) concentrations in the 2015/2016 (see Section 3.1.1). This suggested that slightly greater phytoplankton productivity at Station L2-03 in 2016 was the result of current mine operations and specifically, the introduction of nutrients to the CLT1 system as a result of active quarrying at the QMR2 pit.

3.1.2.2 Camp Lake Tributary 2 (CLT2)

Camp Lake Tributary 2 (CLT2; Station KO-01) chlorophyll a concentrations were consistently low, but within the range observed among the reference creek stations during individual spring, summer and fall seasonal sampling events in 2016 (Figure 3.4). The CLT2 chlorophyll a concentrations also met the AEMP benchmark of less than 3.7 µg/L for all 2016 sampling events. Low phytoplankton productivity, indicative of oligotrophic conditions, was suggested at CLT2 based on comparison of chlorophyll a concentrations to Dodds et al (1998) trophic

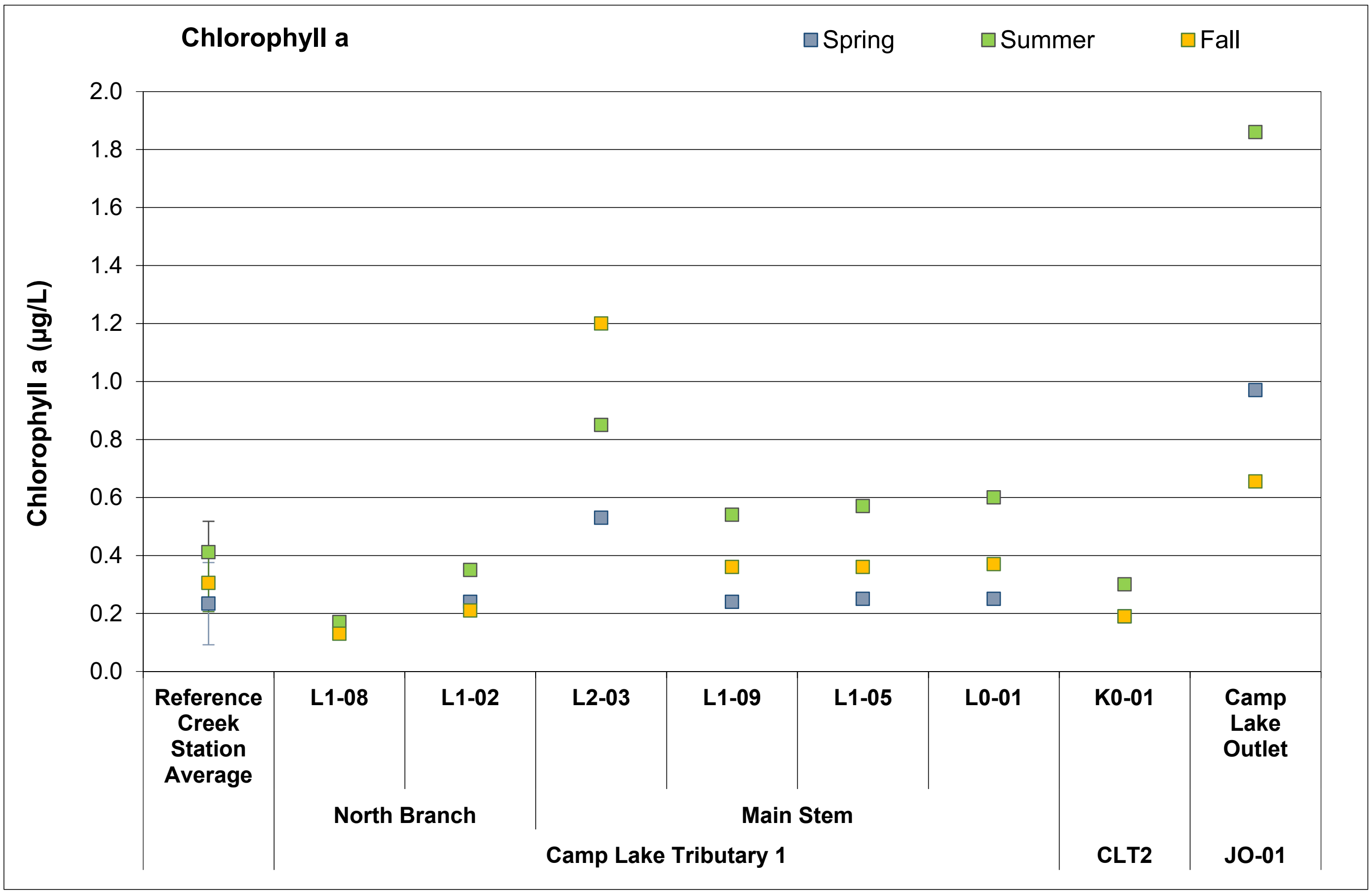

Figure 3.4: Chlorophyll a concentrations at Camp Lake Tributary 1 (CLT-1) and Tributary 2 (CLT-2) phytoplankton monitoring stations, Mary River Project CREMP, 2016. Reference creek stations include the CLT-REF and MRY-REF series (mean ± SD; n = 4).

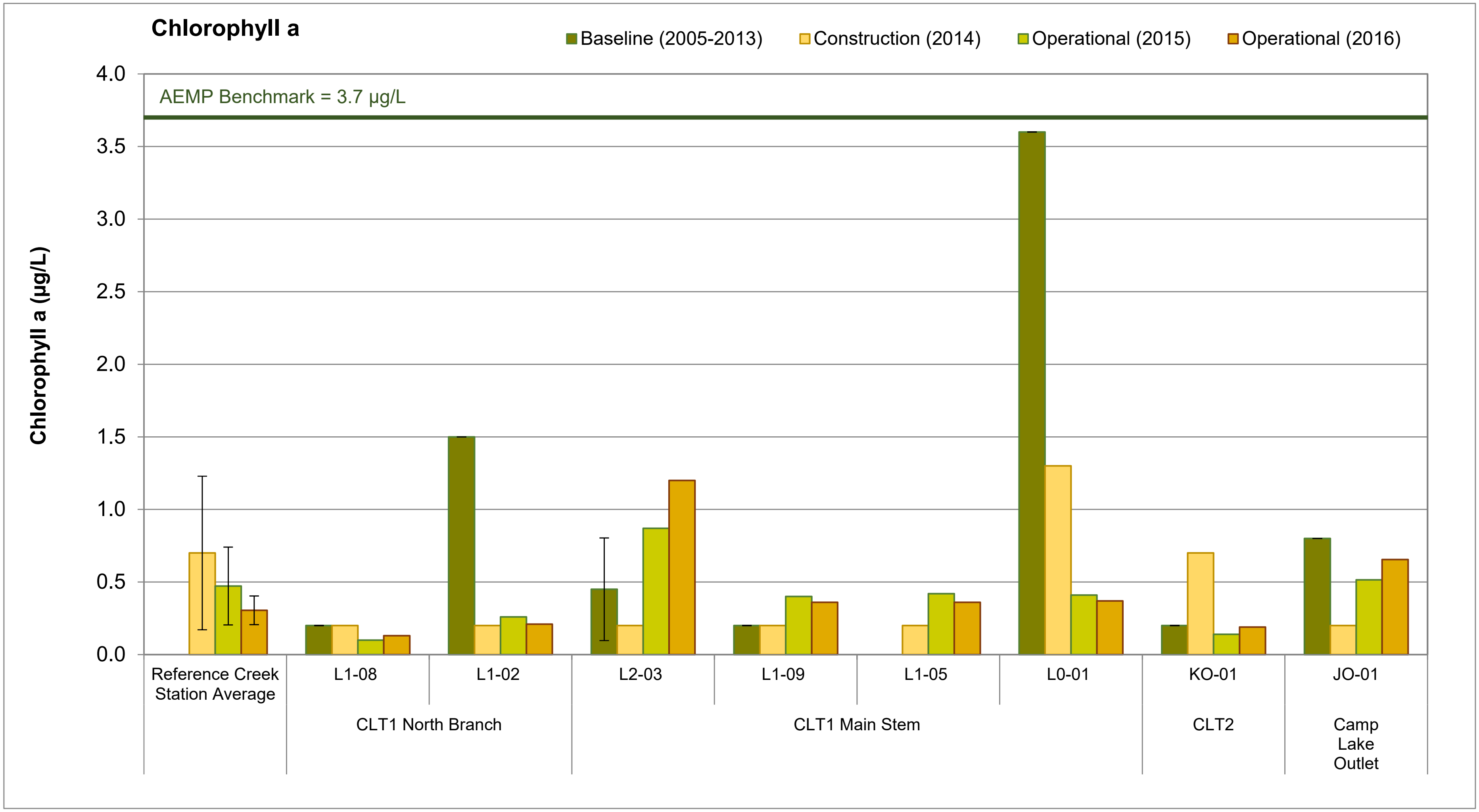

Figure 3.5: Temporal comparison of chlorophyll a concentrations at Camp Lake Tributary 1 (CLT-1) and Tributary 2 (CLT-2) for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during fall, Mary River Project CREMP. The reference creek stations include the CLT-REF and MRY-REF series (mean ± SD; n = 4).

status classification for creek environments. This productivity classification was supported by a WQG categorization of ultra-oligotrophic to oligotrophic based on mean aqueous phosphorus concentrations below 10 µg/L at CLT2 during all spring, summer and fall sampling events (Table 3.1; Appendix Table C.14). Temporal comparisons of the CLT2 chlorophyll a data indicated that the 2015 and 2016 chlorophyll a concentrations were similar to those during the mine baseline period (Figure 3.5). Overall, no mine-related influences to phytoplankton density at CLT2 were suggested by the 2016 chlorophyll a concentration data.

3.1.3 Benthic Invertebrate Community

3.1.3.1 Camp Lake Tributary 1 (CLT1)

North Branch (CLT1 US)

Benthic invertebrate density and Simpson's Evenness did not differ significantly between the CLT1 north branch and Unnamed Reference Creek (Table 3.2). However, in addition to significantly lower richness at the CLT1 north branch compared to Unnamed Reference Creek, differences in community assemblage were suggested between watercourses based on significant differences in Bray-Curtis Index (Table 3.2). Notably, the relative abundance of metal-sensitive chironomids did not differ significantly between the CLT1 north branch and Unnamed Reference Creek, suggesting that the community composition differences between watercourses was unrelated to metal concentrations. Rather, a significantly higher proportion of the shredder functional feeding group (FFG) at the CLT1 north branch suggested the presence of greater amounts of living and/or decomposing large leafy/woody vegetation compared to Unnamed Reference Creek, which was consistent with field observations of bryophyte abundance between watercourses in 2016 (Appendix Tables F.1 and F.7). Temporal comparisons of the CLT1 north branch benthic invertebrate community data indicated that density, richness, Simpson's Evenness and relative abundance of key dominant groups and FFG in 2016 did not show any consistent type and/or direction of significant differences compared to baseline data collected in 2007 and 2011 (Figure 3.6; Appendix Table F.8). Overall, no adverse mine-related influences on benthic invertebrate community features were indicated at the CLT1 north branch in 2016 based on comparisons to 2016 reference creek data and to historical 2007 and 2011 baseline data.

Upper Main Stem (CLT1 L2)

The benthic invertebrate community of upper main stem of Camp Lake Tributary (CLT1 L2), which is located near the QMR2 mine quarry, showed significantly higher benthic invertebrate density and significant differences in community composition (as indicated by Bray-Curtis

Table 3.2: Benthic invertebrate community statistical comparison results among Camp Lake Tributary 1 and Unnamed Reference Creek study areas, Mary River Project CREMP, August 2016.

Metric	Overall four-group ANOVA[a]			ANOVA Comparison to Reference				
	Significant Difference Among Areas?	p-value	Statistical Test	CLT1 Study Area	Significantly Different from Reference?	p-value	Magnitude of Difference (no. of SD)[b]	*Post-hoc* Statistical Test
Density (No. organisms/ m^2)	YES	0.0000	α , δ	Upstream (North Branch)	NO	1.0000	-	Tamhane's
				L2 (Upper Main Stem)	YES	0.0025	9.8	
				Downstream (Lower Main Stem)	NO	0.7027	-	
Richness (Number of Taxa)	YES	0.0005	α , δ	Upstream (North Branch)	YES	0.0045	-5.1	Tukey's HSD
				L2 (Upper Main Stem)	NO	0.6133	-	
				Downstream (Lower Main Stem)	NO	0.5090	-	
Simpson's Evenness	NO	0.6326	α , δ	Upstream (North Branch)	NO	0.8334	-	Tukey's HSD
				L2 (Upper Main Stem)	NO	0.9819	-	
				Downstream (Lower Main Stem)	NO	0.9962	-	
Bray-Curtis Index	YES	0.0000	α , δ	Upstream (North Branch)	YES	0.0000	2.6	Tukey's HSD
				L2 (Upper Main Stem)	YES	0.0000	4.6	
				Downstream (Lower Main Stem)	YES	0.0000	3.6	
Oligochaeta (% of Community)	YES	0.0001	β , δ	Upstream (North Branch)	NO	0.1554	-	Tamhane's
				L2 (Upper Main Stem)	NO	0.1762	-	
				Downstream (Lower Main Stem)	YES	0.0099	14.0	
Hydracarina (% of Community)	YES	0.0000	β , δ	Upstream (North Branch)	NO	0.7896	-	Tukey's HSD
				L2 (Upper Main Stem)	YES	0.0114	3.2	
				Downstream (Lower Main Stem)	***YES***	***0.0027***	***-1.9***	
Chironomidae (% of Community)	NO	0.3439	β , δ	Upstream (North Branch)	NO	0.9884	-	Tukey's HSD
				L2 (Upper Main Stem)	NO	0.5414	-	
				Downstream (Lower Main Stem)	NO	0.9665	-	
Metal-Sensitive Chironomidae (%)	YES	0.0011	β , δ	Upstream (North Branch)	NO	0.9572	-	Tukey's HSD
				L2 (Upper Main Stem)	YES	0.0322	3.6	
				Downstream (Lower Main Stem)	NO	0.2631	-	
Tipulidae (% of Community)	YES	0.0002	β , δ	Upstream (North Branch)	NO	0.2555	-	Tukey's HSD
				L2 (Upper Main Stem)	***YES***	***0.0053***	***-1.5***	
				Downstream (Lower Main Stem)	NO	0.9621	-	

[a] Data analysis included: α - data untransformed; β - data logit transformed; ε - data log transformed; δ - single factor ANOVA test; γ - ANOVA test validated using Kruskal-Wallis H- or Mann Whitney U-test.

[b] Magnitude calculated by comparing the difference between the reference area and mine-exposed area means divided by the reference area standard deviation.

[shaded box] Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10 that were also outside of a CES of ±2 SD, suggesting an ecologically meaningful difference.

BOLD Bold text values indicate significant differences between study areas based on ANOVA p-value less than 0.10, but a Critical Effect Size within ±2 SD, suggesting the difference is not ecologically meaningful.

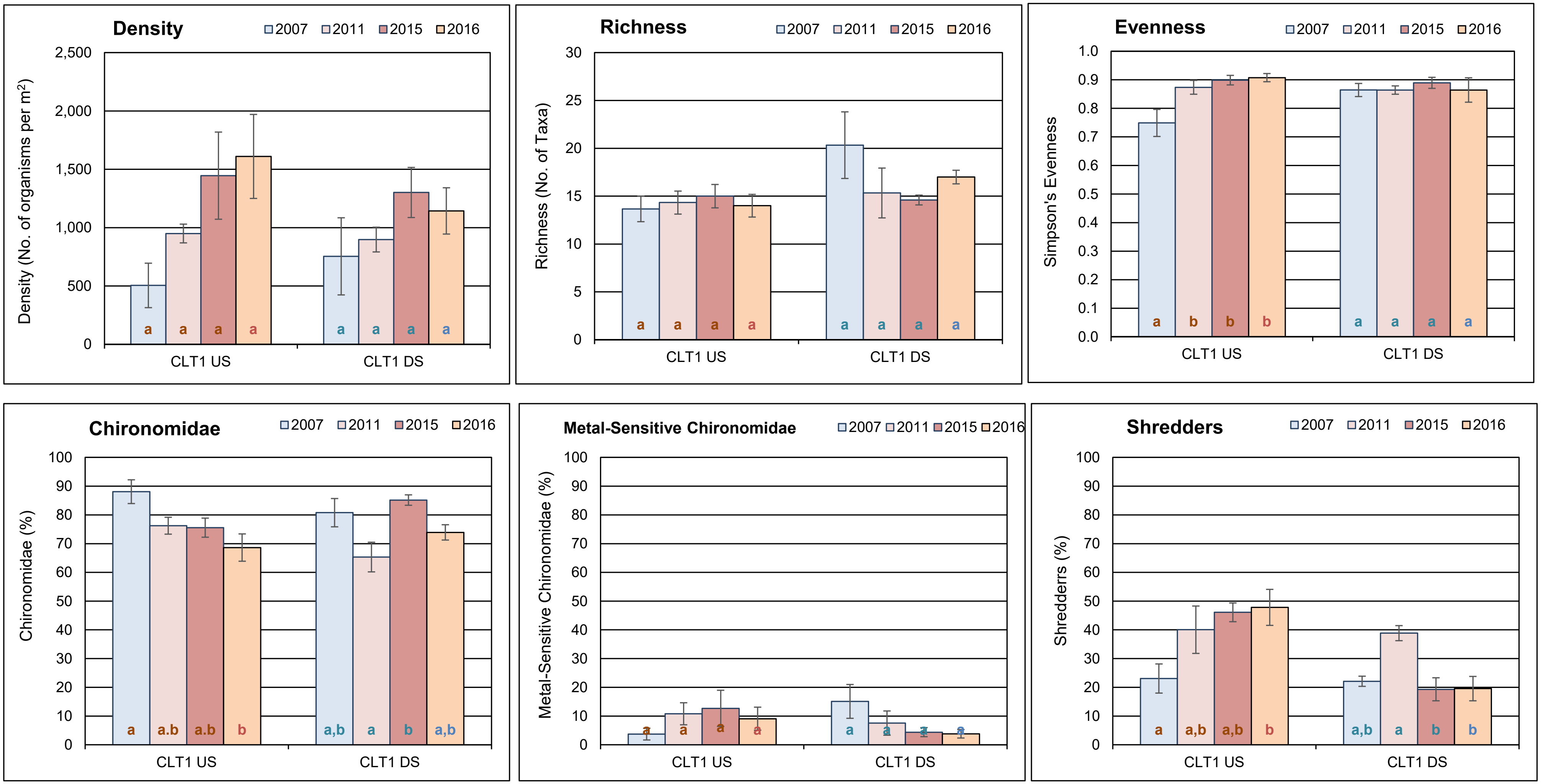

Figure 3.6: Comparison of key benthic invertebrate metrics (mean ± SE) at Camp Lake Tributary 1 stations among mine baseline (2007, 2011) and operational (2015, 2016) periods, Mary River Project CREMP, 2016. The same like-coloured letter inside bars indicate no significant difference between study years.

Index) compared to Unnnamed Reference Creek in 2016 (Table 3.2; Appendix Table F.7). Compositionally, the relative abundances of Hydracarina (water mites) and metal-sensitive chironomids were significantly higher at the CLT1 upper main stem than at Unnamed Reference Creek (Table 3.2; Appendix Table F.7). High relative abundance of metal-sensitive chironomids at the CLT1 upper main stem area, despite highest aqueous concentrations of metals within the Camp Lake system (Figure 3.2; Appendix Figure C.2), was consistent with concentrations of most metals below WQG at this area (see Appendix Table C.14). In addition, high relative abundance of metal-sensitive chironomids at the CLT1 upper main stem suggested that iron and uranium, which were observed at concentrations above WQG at this area (see Appendix Table C.14), were in forms that were not highly bioavailable. Other notable community compositional differences, including significantly higher and lower relative abundance of filterer and shredder FFG, respectively, at the CLT1 upper main stem compared to Unnamed Reference Creek (Appendix Table F.7), suggested a shift in dominant food resource at the CLT1 upper main stem. Specifically, a relatively high abundance of filterers at the CLT1 upper main stem suggested a greater reliance upon food resources suspended in the water column, including phytoplankton and fine particulate organic matter, than at Unnamed Reference Creek. These results were consistent with occurrence of relatively high chlorophyll a concentrations at the CLT1 upper main stem compared to the other CLT1 stations and the reference creeks (see Section 3.1.1.1). Collectively, the combination of relatively high benthic invertebrate density, richness (compared to the CLT1 north branch; Table 3.2; Appendix Table F.7) and proportion of the filterer FFG, together with relatively high chlorophyll a and aqueous nitrate concentrations, was consistent with a slight, mine-related enrichment effect on the benthic invertebrate community at the CLT1 upper main stem in 2016.

Despite suggestion of a mine-related enrichment influence at the CLT1 upper main stem, temporal comparisons did not indicate significant differences in benthic invertebrate density, richness, Simpson's Evenness and relative abundance of key dominant groups and FFG in 2016 compared to baseline data collected in 2007 (Figure 3.6; Appendix Table F.9). In turn, this suggested that benthic invertebrate community features at the CLT1 upper main stem in 2016 had not changed appreciably from the pre-mine operation period, and that differences in community composition relative to reference conditions may reflect natural phenomena.

Lower Main Stem (CLT1 DS)

The benthic invertebrate community at the lower main stem of Camp Lake Tributary (CLT1 DS), just downstream of the mine tote road, showed no significant, ecologically meaningful, differences in density, richness and Simpson's Evenness compared to Unnamed Reference Creek (Table 3.2; Appendix Table F.7). Nevertheless, the benthic invertebrate community assemblage at the CLT1 lower main stem differed from the reference areas based on significant differences in Bray-Curtis Index and composition of dominant invertebrate groups, FFG and habit preference groups (HPG; Table 3.2). Because no significant difference in the relative abundance of metal-sensitive chironomids was indicated between the CLT1 lower main stem and reference area (Table 3.2), the community composition differences between the mine-exposed and reference areas appeared to be unrelated to metal concentrations. Rather, the key differences in benthic invertebrate composition between areas, which included a significantly lower proportion of the collector-gatherer FFG and the clinger HPG at the CLT1 lower main stem, may have reflected greater reliance on interstitially deposited particulate organic matter food resources compared to a heavier reliance on in-stream vegetation as a food source at the reference area. Because substrate with significantly smaller diameter was sampled at the CLT1 lower main stem compared to Unnamed Reference Creek (Appendix Tables F.3 and F.4), differences in habitat may have also contributed to the indicated differences in benthic invertebrate community compositional features between areas.

Temporal comparison of the CLT1 lower main stem data indicated no significant differences in benthic invertebrate density, richness, Simpson's Evenness or the proportion of metal-sensitive chironomids between individual years of mine operation (2015, 2016) and the mine baseline (2007, 2011 data) period (Figure 3.6; Appendix Table F.10). In addition, no consistent types and/or direction of differences in the relative abundance of dominant groups or FFG were indicated between 2016 and years in which baseline data were collected at the CLT1 lower main stem (Figure 3.6; Appendix Table F.10). Overall, these results suggested no substantial changes in benthic invertebrate community features between the mine operational and mine baseline periods at the CLT1 lower main stem.

3.1.3.2 Camp Lake Tributary 2

At Camp Lake Tributary 2 (CLT2), sampling was conducted upstream and downstream of the mine tote road (areas CLT2 US and CLT2 DS, respectively) to assess for potential mine-related influences to the benthic invertebrate community. Benthic invertebrate density was significantly lower at both CLT2 study areas compared to Unnamed Reference Creek (Table 3.3). In addition, differences in community composition were indicated by significantly higher Bray-Curtis Index at both CLT2 study areas compared to the Unnamed Reference Creek. A significantly lower relative abundance of Hydracarina (water mites) and HPG clingers occurred at both CLT2 study areas compared to Unnamed Reference Creek (Table 3.3). Significantly lower relative abundance of chironomids and significantly higher relative abundance of FFG collector-gatherers and HPG sprawlers was also indicated at the CLT2 downstream area compared to Unnamed Reference Creek (Table 3.3; Appendix Table F.14).

Table 3.3: Benthic invertebrate community statistical comparison results among Camp Lake Tributary 2 and Unnamed Reference Creek study areas, Mary River Project CREMP, August 2016.

Season	Overall 3-group Comparison			Summary		Pair-wise, post-hoc comparisons[a]					
	Significant Difference Among Areas?	p-value	Statistical Test[b]	Area	Mean Value	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Magnitude of Difference	Statistical Test
Density (No. organisms/ m^2)	YES	0.00008	α	Reference	1,645	Reference	CLT2 US	YES	0.0311	-2.0	Tamhane's (α)
				CLT2 Upstream	412	Reference	CLT2 DS	YES	0.0188	-2.3	
				CLT2 Downstream	205	CLT2 US	CLT2 DS	YES	0.0187	-2.1	
Richness (Number of Taxa)	NO	0.10651	α , γ	Reference	18.6	Reference	CLT2 US	NO	0.7365	-	Tamhane's (α)
				CLT2 Upstream	17.2	Reference	CLT2 DS	NO	0.1708	-	
				CLT2 Downstream	14.0	CLT2 US	CLT2 DS	NO	0.4707	-	
Simpson's Evenness	NO	0.35742	α	Reference	0.873	Reference	CLT2 US	NO	0.8111	-	Tukey's (α)
				CLT2 Upstream	0.898	Reference	CLT2 DS	NO	0.6688	-	
				CLT2 Downstream	0.838	CLT2 US	CLT2 DS	NO	0.3291	-	
Bray-Curtis Index	YES	0.00000	α	Reference	0.237	Reference	CLT2 US	YES	0.0000	3.8	Tukey's (α)
				CLT2 Upstream	0.726	Reference	CLT2 DS	YES	0.0000	4.7	
				CLT2 Downstream	0.844	CLT2 US	CLT2 DS	NO	0.1376	-	
Oligochaeta (% of Community)	YES	0.08905	β	Reference	2.5%	Reference	CLT2 US	NO	0.6686	-	Tamhane's (β)
				CLT2 Upstream	4.9%	Reference	CLT2 DS	NO	0.4703	-	
				CLT2 Downstream	1.9%	CLT2 US	CLT2 DS	NO	0.2621	-	
Hydracarina (% of Community)	YES	0.00630	β	Reference	11.7%	Reference	CLT2 US	***YES***	***0.0220***	***-1.7***	Tukey's (β)
				CLT2 Upstream	5.5%	Reference	CLT2 DS	***YES***	***0.0078***	***-1.9***	
				CLT2 Downstream	4.5%	CLT2 US	CLT2 DS	NO	0.8324	-	
Chironomidae (% of Community)	YES	0.09836	β	Reference	70.8%	Reference	CLT2 US	NO	0.2460	-	Tukey's (β)
				CLT2 Upstream	79.5%	Reference	CLT2 DS	***YES***	***0.0955***	***1.3***	
				CLT2 Downstream	82.4%	CLT2 US	CLT2 DS	NO	0.8252	-	
Metal-Sensitive Chironomidae (%)	NO	0.30569	β	Reference	8.9%	Reference	CLT2 US	NO	0.2847	-	Tukey's (β)
				CLT2 Upstream	5.3%	Reference	CLT2 DS	NO	0.5718	-	
				CLT2 Downstream	5.4%	CLT2 US	CLT2 DS	NO	0.8413	-	
Tipulidae (% of Community)	NO	0.20459	β	Reference	4.3%	Reference	CLT2 US	NO	0.9992	-	Tukey's (β)
				CLT2 Upstream	4.0%	Reference	CLT2 DS	NO	0.2706	-	
				CLT2 Downstream	2.2%	CLT2 US	CLT2 DS	NO	0.2564	-	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data logit transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Kruskal-Wallis H-test (multiple group comparison) or Mann-Whitney U-test (pair-wise comparison), as appropriate.

[grey box] Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10 that were also outside of a CES of ±2 SD, suggesting an ecologically meaningful difference.

BOLD Bold text values indicate significant differences between study areas based on ANOVA p-value less than 0.10, but a Critical Effect Size within ±2 SD, suggesting the difference is not ecologically meaningful.

In addition to a greater number of differences, the magnitude of these differences (compared to Unnamed Reference Creek) was greater at the CLT2 downstream area than at the upstream area, potentially indicating that the mine tote road had a greater influence on benthic invertebrates within CLT2 (Table 3.3; Appendix Table F.14). However, differences in habitat features that included significantly greater water velocity and less in-stream vegetation (Appendix Tables F.1, F.3 and F.4) potentially accounted for lower benthic invertebrate density and relative abundance of water mites and other HPG clinger taxa at the CLT2 study areas compared to the Unnamed Reference Creek. In part, this was supported by the lack of significant differences in richness, Simpson's Evenness, and relative abundance of all dominant invertebrate groups, FFG and HPG between the CLT2 upstream and downstream areas (Table 3.3; Appendix Table F.14).

Temporal comparisons indicated no significant differences in any benthic invertebrate community endpoints, including the relative abundance of all dominant invertebrate groups and FFG, at both CLT2 study areas in 2016 compared to 2007 baseline data with the exception of Simpson's Evenness (Figure 3.7; Appendix Tables F.15 and F.16.). Because high Simpson's Evenness is normally associated with a diverse, healthy benthic invertebrate community, the occurrence of significantly higher Simpson's Evenness at CLT2 in 2016 compared to 2007 was not consistent with an adverse influence related to recent mine operations. These results suggested that differences in benthic invertebrate community features between CLT2 and Unnamed Reference Creek in 2016 were most likely related to natural differences in habitat between watercourses, and that no appreciable changes to the benthic invertebrate community of CLT2 have occurred since commercial mine operations commenced in 2014.

3.2 Camp Lake (JLO)

3.2.1 Water Quality

In-situ water quality profiles conducted at Camp Lake showed no substantial spatial differences in water temperature, dissolved oxygen, pH or specific conductance with progression from the CLT1 inlet to the lake outlet during any of the winter, summer or fall seasonal sampling events in 2016[4] (Appendix Figures C.3 - C.6). Camp Lake water temperature profiles in 2016 suggested no thermal stratification during the winter and summer sampling events, but weak stratification during fall sampling that mirrored the fall temperature profile pattern at Reference Lake 3 (Figure 3.8). On average, water temperature near the bottom of the water column at

[4] The summer 2016 data suggested considerable variation among Camp Lake stations, but review of field collection notes suggested that this variation likely reflected meter calibration-related differences between sampling dates.

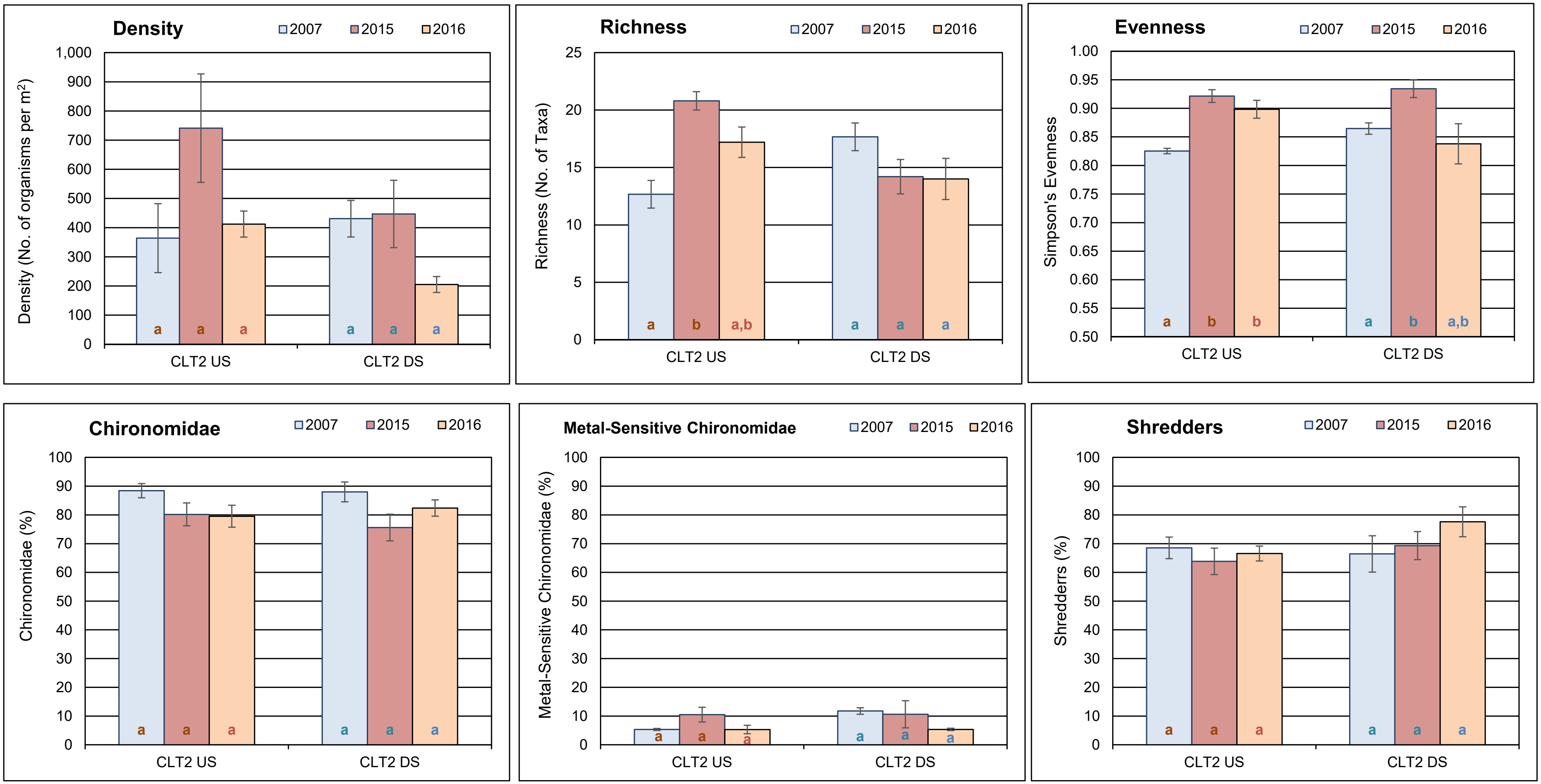

Figure 3.7: Comparison of key benthic invertebrate metrics (mean ± SE) at Camp Lake Tributary 2 stations among mine baseline (2007, 2011) and operational (2015, 2016) periods, Mary River Project CREMP, 2016. The same like-coloured letter inside bars indicate no significant difference between study years.

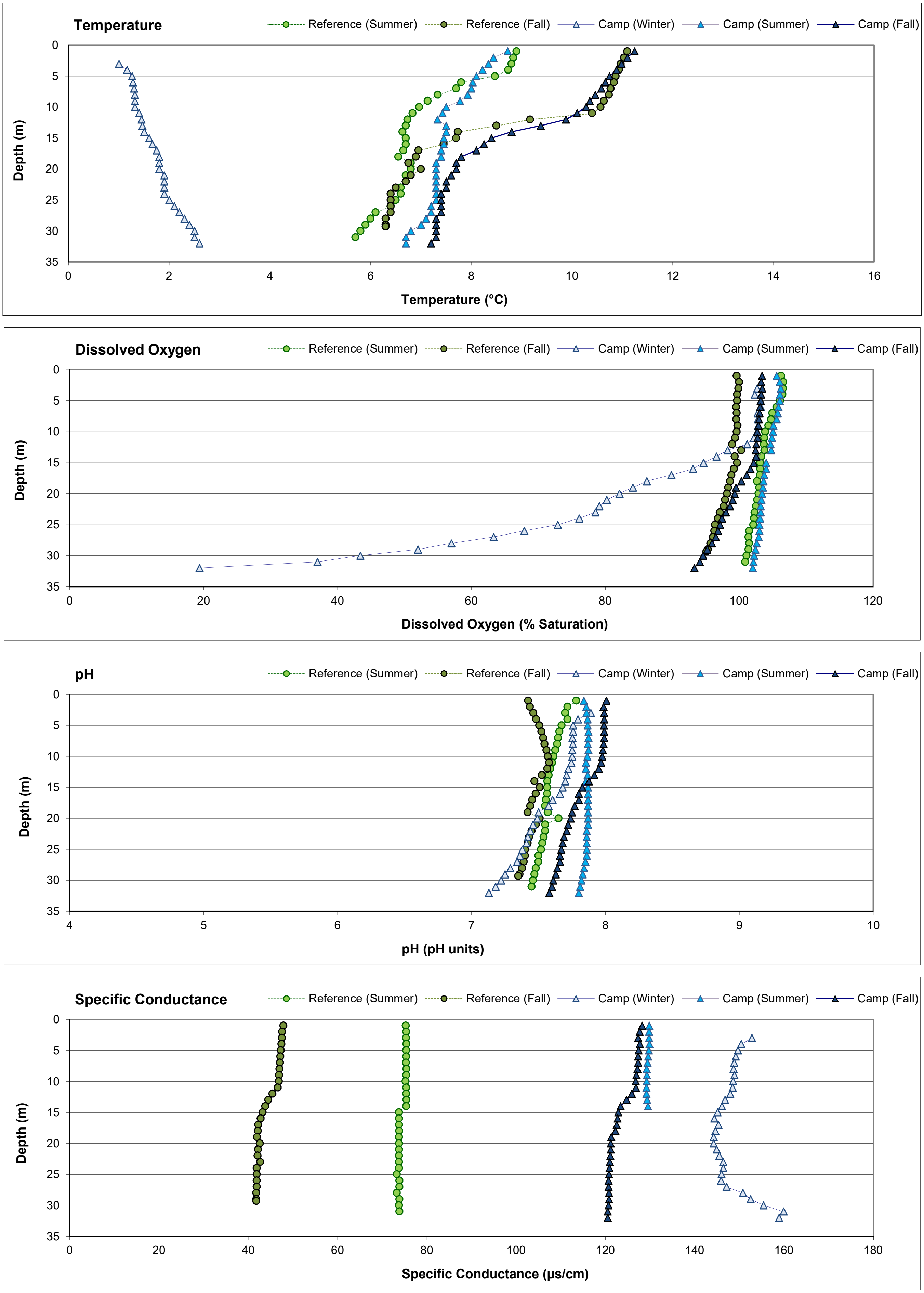

Figure 3.8: Average *in-situ* water quality with depth from surface at Camp Lake (mine-exposed area) compared to Reference Lake 3 during winter, summer, and fall sampling events, Mary River Project CREMP, 2016.

littoral stations of Camp Lake was significantly cooler than at Reference Lake 3 (Figure 3.9; Appendix Tables C.22 – C.23). Although cooler bottom water temperatures at Camp Lake littoral stations may have reflected greater station depth compared to the reference lake, the small incremental difference in water temperature (i.e., 0.7˚C) was unlikely to result in meaningful ecological differences between lakes. Dissolved oxygen profiles conducted at Camp Lake in 2016 showed declining saturation levels with increased depth beginning at approximately 12 m below surface in the winter, but otherwise showed no appreciable changes from surface to bottom during summer or fall 2016, mirroring the dissolved oxygen profiles at Reference Lake 3 (Figure 3.8) and observations from Camp Lake in 2015. Dissolved oxygen conditions near the bottom of the water column at littoral sampling depths of Camp Lake were fully saturated, and significantly higher than at Reference Lake 3 during fall sampling in 2016 (Figure 3.9; Appendix Table C.23). In addition, dissolved oxygen saturation at Camp Lake was typically well above the WQG minimum for the protection of cold water biota (i.e., 54%) during all seasonal sampling events in 2016 except at water depths greater than approximately 30 m in winter (Figures 3.8 and 3.9). This suggested that dissolved oxygen concentrations were not likely to be limiting to biota at Camp Lake for the entire lake volume for the majority of the year.

In-situ profiles of pH and specific conductance showed no substantial change from the surface to bottom of the Camp Lake water column, indicating the absence of any chemical stratification (Figure 3.8). Although the bottom pH at littoral stations of Camp Lake was significantly higher than at the reference lake during the fall sampling event (Appendix Tables C.22 – C.23), the mean incremental difference between lakes was very small (i.e., 0.3 pH units) and all pH values were consistently within WQG limits (Figure 3.9), suggesting that the pH difference between lakes was not ecologically meaningful. Specific conductance was significantly higher at Camp Lake compared to the reference lake during fall sampling in 2016 (Figure 3.9). However, because mean specific conductance at Camp Lake was intermediate to that of the reference creek and river stations, the occurrence of higher specific conductance at Camp Lake compared to the reference lake likely reflected natural phenomena. Secchi depth readings, which served as a proxy for water clarity, were significantly lower (i.e., shallower) at Camp Lake compared to Reference Lake 3 during the 2016 fall sampling event (Appendix Tables C.22 – C.23). No spatial gradient in Secchi depth readings was apparent with progression from the CLT inlet to the lake outlet stations in fall 2016 at Camp Lake (Appendix Table C.21).

Water chemistry data collected at Camp Lake in 2016 showed no distinct spatial differences with progression from the CLT inlets to the lake outlet during any of the winter, summer or fall sampling events in 2016 (Table 3.4; Appendix Table C.24), suggesting that the lake waters

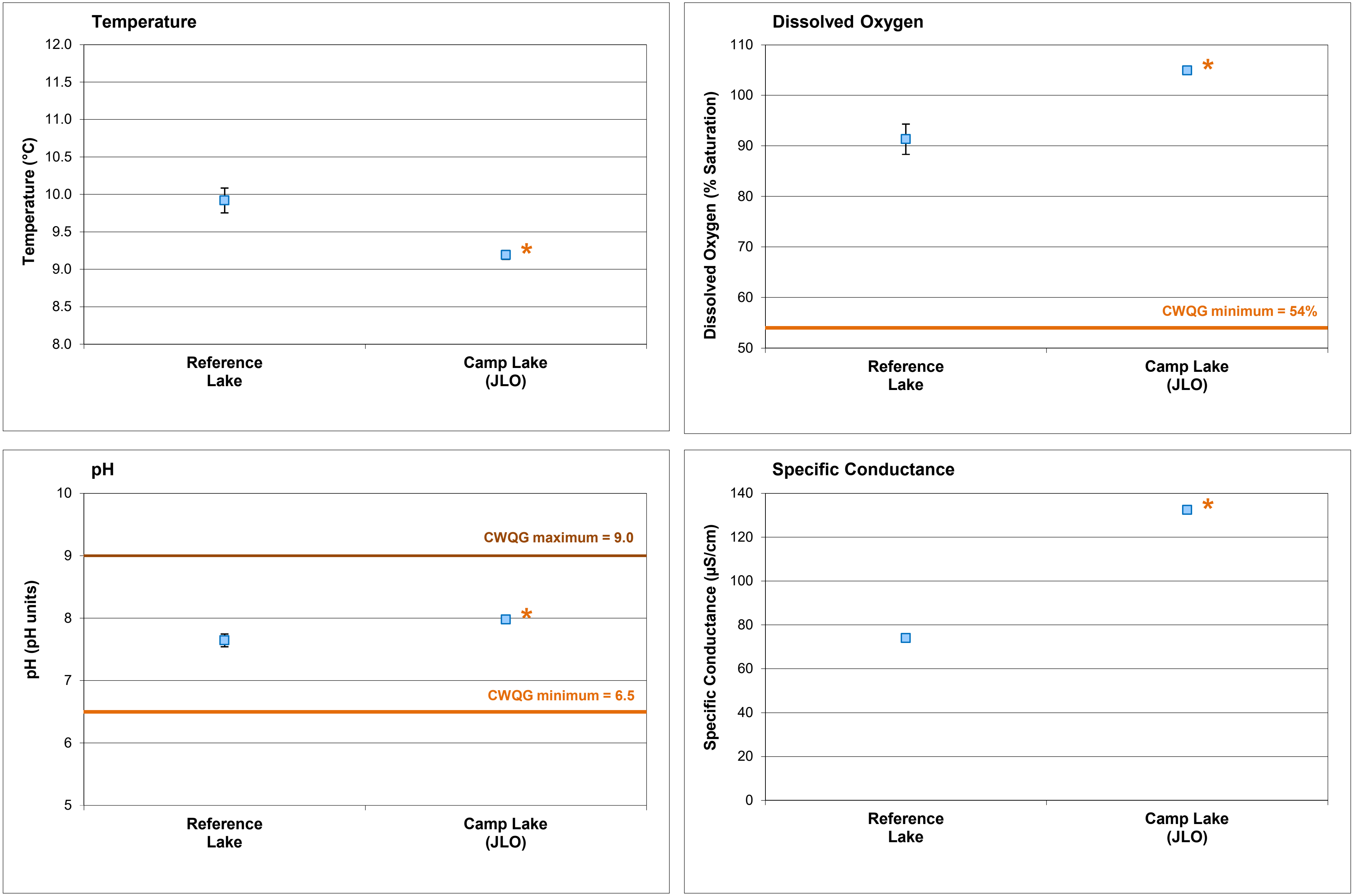

Figure 3.9: Comparison of in-situ water quality variables (mean ± SD; n = 5) measured near the bottom of the water column at Camp Lake (JLO) and Reference Lake 3 (REF3) littoral benthic invertebrate community stations, Mary River Project CREMP, August 2016. An asterisk (*) next to the Camp Lake data point indicates a significant difference compared to the reference lake measure.

Table 3.4: Water chemistry at Camp Lake (JLO) and Reference Lake 3 (REF3) monitoring stations, Mary River Project CREMP, August 2016. Values are averages of samples taken from the surface and the bottom of the water column at each station.

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Reference Lake 3 Average (n = 3) Fall 2016	Camp Lake Stations JL0-02 22-Aug-16	JL0-10 22-Aug-16	JL0-01 22-Aug-16	JL0-07 22-Aug-16	JL0-09 22-Aug-16	J0-01 Camp Lake Outlet 20-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	84	139	139	135	136	136	137
	pH (lab)	pH	6.5 - 9.0	-	7.68	8.11	8.11	8.04	8.00	8.07	8.01
	Hardness (as $CaCO_3$)	mg/L	-	-	35	65	67	64	65	66	67
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	2.45	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	39	76	73	64	71	74	67
	Turbidity	NTU	-	-	0.33	0.47	0.43	0.72	0.47	0.47	0.40
	Alkalinity (as $CaCO_3$)	mg/L	-	-	33	65	61	65	65	67	64
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	0.040	<0.020	<0.020	0.042	0.030	<0.020	<0.020
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.7	1.7	1.65	1.55	1.8	1.7	1.7
	Total Organic Carbon	mg/L	-	-	2.8	2.4	1.8	1.725	2.1	2.4	2.0
	Total Phosphorus	mg/L	0.020[α]	-	0.0099	0.0037	0.0059	0.0036	0.0045	0.0069	0.0039
	Phenols	mg/L	0.004[α]	-	0.0031	0.0015	0.0011	0.0017	0.0012	0.0061	0.0038
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.27	3.63	3.49	3.39	3.50	3.42	3.47
	Sulphate (SO_4)	mg/L	218[β]	218	4.1	2.3	2.2	2.1	2.1	2.1	2.2
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0042	0.0062	0.0050	0.0042	0.0052	0.0050	0.0047
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00653	0.00678	0.00644	0.00616	0.00657	0.00634	0.00663
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	7.0	13.7	13.5	13.3	13.2	13.2	13.3
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00082	0.00101	0.00084	0.00080	0.00093	0.00084	0.00082
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.094
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	0.0014	0.0013	0.0013	0.0013	0.0012	0.0011
	Magnesium (Mg)	mg/L	-	-	4.3	8.2	8.0	7.6	7.8	8.0	8.2
	Manganese (Mn)	mg/L	0.935[β]	-	0.00062	0.00146	0.00138	0.00153	0.00171	0.00154	0.00277
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.00014	0.00026	0.00026	0.00025	0.00025	0.00026	0.00027
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00059	0.00061	0.00058	0.00060	0.00060	0.00073
	Potassium (K)	mg/L	-	-	0.9	1.1	1.1	1.0	1.1	1.1	1.0
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.42	0.36	0.34	0.35	0.41	0.36	0.38
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.84	1.44	1.36	1.33	1.45	1.40	1.36
	Strontium (Sr)	mg/L	-	-	0.0081	0.0106	0.0103	0.0100	0.0100	0.0100	0.0098
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000270	0.0008175	0.0007745	0.00073275	0.000711	0.00075	0.000782
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.3 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data (2006 - 2013) specific to Camp Lake.

(grey shading) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the applicable AEMP benchmark.

were well mixed laterally. Only a slight elevation (i.e., 3- to 5-fold higher) in manganese concentrations was evident at Camp Lake compared to the reference lake during the summer 2016 sampling event (Table 3.4; Appendix Table C.26). Concentrations of manganese, together with aluminum, showed a significant positive correlation with turbidity at Camp Lake using all 2016 data (r = 0.52 and 0.65, respectively), suggesting that these metals were largely associated with suspended particulate material in Camp Lake and thus were unlikely to be bioavailable. Notably, concentrations of all parameters were well below established WQG and AEMP benchmarks at Camp Lake during all sampling events in 2016[5] (Table 3.4; Appendix Table C.24), further indicating that parameter concentrations at Camp Lake were unlikely to adversely affect biota.

Temporal comparisons of Camp Lake water chemistry data indicated that, of the parameters shown to be elevated at CLT1 in 2016, only conductivity and concentrations of chloride, molybdenum, sodium, strontium and uranium showed continuous increases over the mine baseline, construction and operational periods (Figure 3.10; Appendix Figure C.7). Other parameters, including hardness, iron, manganese, nitrate and sulphate, showed no consistent direction of change between the mine baseline and operational periods. Notably, parameter concentrations were consistently well below WQG and AEMP benchmarks through all years of mine construction and operation at Camp Lake (e.g., Appendix Table C.24) and thus, no adverse mine-related influences on lake water quality were suggested at Camp Lake since commercial mine operations commenced in 2014.

3.2.2 Sediment Quality

Surficial sediment (i.e., top 2 cm) collected at the Camp Lake coring stations was composed mainly of silty loam and sandy loam with low total organic carbon (TOC) content, except at the outlet littoral station (JLO-30) where sand constituted the predominant substrate material (Figure 3.11). A surficial and/or sub-surface layer of oxidized material (likely iron hydroxide or oxy-hydroxides), visible as reddish-orange to orange-brown substrate, was commonly observed in sediments of Camp Lake (Appendix Tables D.5 – D.7). However, similar substrate was observed at Reference Lake 3 (Appendix Tables D.1 – D.3), suggesting the natural occurrence of iron (oxy)hydroxides in the sediment of lakes within the mine LSA. Substrates of Camp Lake exhibited minor, sporadic blackening at sediment depths greater than 2 cm at some stations, suggesting occasional incidence of reducing conditions within substrates of the lake. However, no strongly defined redox boundaries were identified visually, and no noticeable sulphidic odours potentially associated with reducing sediment conditions were

[5] Refer to footnote 2 (page 23) and Appendix B regarding phenol concentrations above WQG at the mine-exposed and reference areas of the Mary River Project LSA waterbodies.

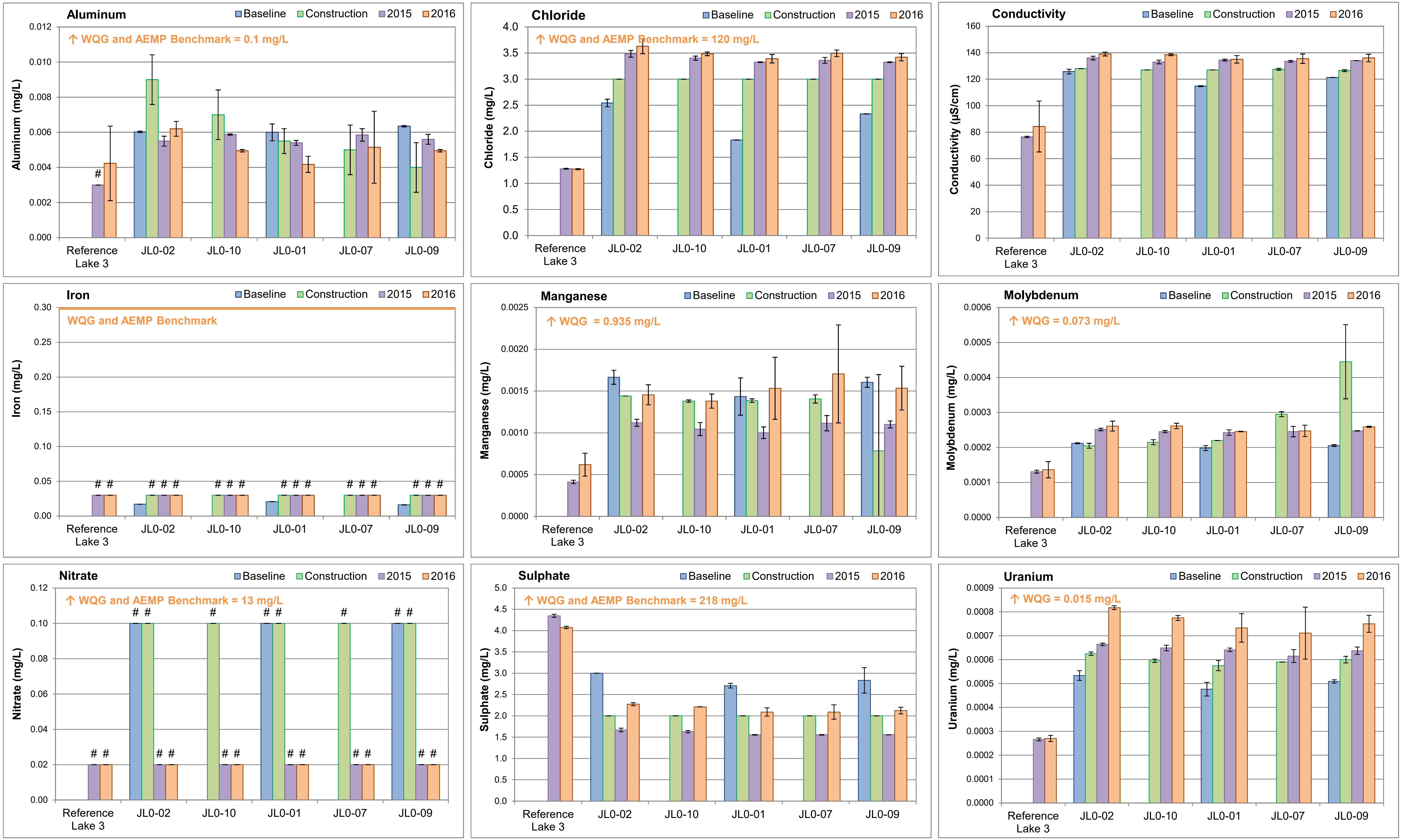

Figure 3.10: Temporal comparison of water chemistry at Camp Lake (JLO) for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during fall. Values represent mean ± SD. Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.3 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to Camp Lake.

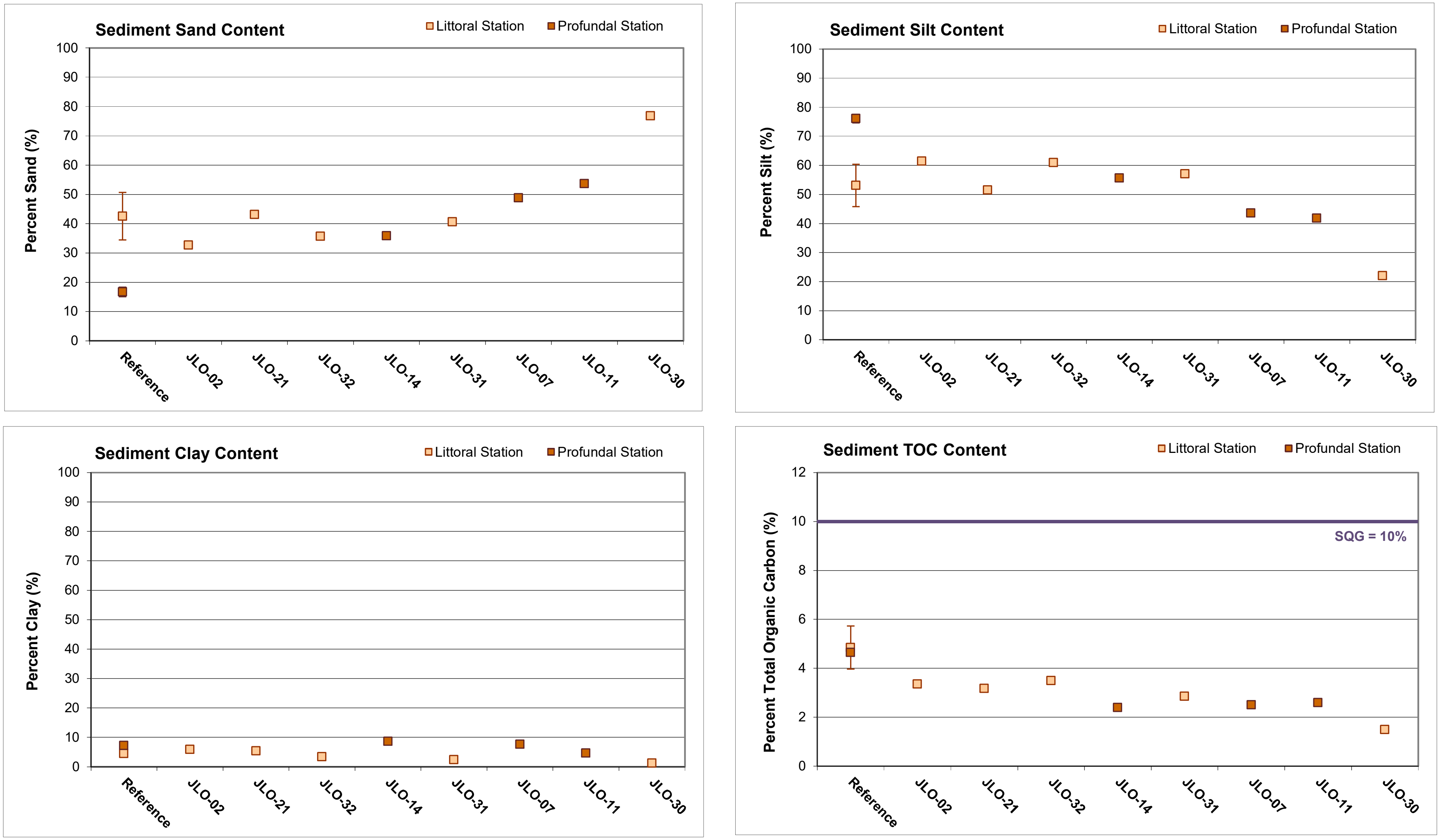

Figure 3.11: Sediment particle size and total organic carbon (TOC) content comparisons among Camp Lake (JLO) sediment monitoring stations and to Reference Lake 3 averages (mean ± SE), Mary River Project CREMP, August 2016.

detected at Camp Lake littoral and profundal stations to sediment depths as great as approximately 20 cm during the 2016 fall sampling event (Appendix Tables D.5 – D.7). Qualitative observations suggestive of reducing sediment conditions were similar between Camp Lake and Reference Lake 3 in 2016 (Appendix Tables D.1 – D.3 and D.5 – D.7), which indicated that factors leading to reduced sediment conditions were comparable between lakes.

No spatial gradients in sediment metal concentrations were evident with progression from stations located nearest to the CLT1 inlet to those located near the lake outlet of Camp Lake in 2016 (Appendix Table D.9). Sediment metal concentrations were generally lower at littoral stations than at profundal stations of Camp Lake (Table 3.5; Appendix Table D.9), mirroring similar patterns at the reference lake. On average, sediment arsenic and manganese concentrations were slightly elevated (i.e., 2- to 5-fold higher) at Camp Lake littoral stations compared to sediment at Reference Lake 3 littoral stations (Table 3.5; Appendix Table D.10). However, metal concentrations in the profundal sediment of Camp Lake were comparable to those of the reference lake in 2016 (Table 3.5; Appendix Table D.10). Although mean iron, manganese and phosphorus concentrations were above respective SQG at Camp Lake littoral and/or profundal stations, mean concentrations of iron and manganese were also above SQG in the Reference Lake 3 profundal sediments in 2016 (Table 3.5). Similarly, although mean arsenic concentrations in littoral and profundal sediments, and mean iron and phosphorus concentrations in profundal sediments, were above respective AEMP benchmarks at Camp Lake, mean arsenic and iron concentrations were also above AEMP benchmarks in profundal sediment of Reference Lake 3 (Table 3.5). These data suggested natural elevation of arsenic, iron and manganese in sediments of LSA lakes relative to applicable SQG and/or AEMP benchmarks.

Temporal comparisons of the sediment chemistry data indicated slightly higher (2- to 5-fold greater) arsenic, manganese and molybdenum concentrations in littoral and/or profundal sediment of Camp Lake in 2016 compared to the baseline period[6] (Figure 3.12; Appendix Table D.10). Of these metals, only manganese showed progressively higher concentrations over baseline, mine construction and 2015 and 2016 mine operation periods at littoral stations of Camp Lake (Figure 3.12). Similarly, arsenic and other metals including barium, iron, magnesium and phosphorus, showed continuously higher concentrations between mine baseline and 2016 periods at profundal stations of Camp Lake (Figure 3.12; Appendix

[6] Reported sediment boron concentrations in 2015 and 2016 were considerably higher (i.e., 10- to 70-fold) than those reported during both the baseline and 2014 studies at all mine-exposed lakes. The lack of any distinct gradient in the magnitude of the elevation in boron concentrations among stations within each lake and among study lakes suggested that the stark contrast in boron concentrations between recent data and data collected prior to 2015 was likely due to laboratory-based analytical differences.

Table 3.5: Sediment particle size, total organic carbon, and metal concentrations at Camp Lake (JLO) and Reference Lake 3 (REF3) sediment monitoring stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Littoral Stations		Profundal Stations	
					Reference Lake (n = 5)	Camp Lake (n = 5)	Reference Lake (n = 5)	Camp Lake (n = 3)
					Average ± Std. Error	Average ± Std. Error	Average ± Std. Error	Average ± Std. Error
Non-metals	Sand	%	-	-	42.5 ± 8.1	45.8 ± 8.0	16.7 ± 1.5	46.1 ± 5.3
	Silt	%	-	-	53.1 ± 7.3	50.6 ± 7.4	76.1 ± 1.4	47.0 ± 4.3
	Clay	%	-	-	4.4 ± 1.0	3.7 ± 0.9	7.2 ± 0.4	6.9 ± 1.2
	Moisture	%	-	-	89.7 ± 6.0	73.5 ± 4.2	83.5 ± 5.4	68.8 ± 4.0
	Total Organic Carbon	%	10^{α}	-	4.85 ± 0.88	2.87 ± 0.36	4.64 ± 0.13	2.49 ± 0.06
Metals	Aluminum (Al)	mg/kg	-	-	16,480 ± 397	13,460 ± 1,760	25,150 ± 1,418	18,900 ± 702
	Antimony (Sb)	mg/kg	-	-	<0.10 ± 0	<0.11 ± 0.006	0.12 ± 0.02	<0.10 ± 0
	Arsenic (As)	mg/kg	17	5.9	3.71 ± 0.26	***8.70*** ± 1.96	***6.47*** ± 0.27	***8.94*** ± 2.41
	Barium (Ba)	mg/kg	-	-	112 ± 11	128 ± 28	162 ± 8	126 ± 33
	Beryllium (Be)	mg/kg	-	-	0.67 ± 0.02	0.77 ± 0.10	1.02 ± 0.05	1.04 ± 0.04
	Bismuth (Bi)	mg/kg	-	-	<0.20 ± 0	0.30 ± 0.04	0.21 ± 0.00	0.32 ± 0.02
	Boron (B)	mg/kg	-	-	13.0 ± 0.9	20.9 ± 2.6	19.2 ± 1.0	27.9 ± 1.5
	Cadmium (Cd)	mg/kg	3.5	1.5	0.146 ± 0.035	0.201 ± 0.044	0.180 ± 0.010	0.176 ± 0.027
	Calcium (Ca)	mg/kg	-	-	5,128 ± 470	4,404 ± 611	6,111 ± 156	4,540 ± 87
	Chromium (Cr)	mg/kg	90	98	55.0 ± 1.2	57.5 ± 6.9	80.0 ± 4.1	76.2 ± 2.0
	Cobalt (Co)	mg/kg	-	-	10.15 ± 0.57	17.00 ± 2.44	18.15 ± 0.75	20.30 ± 2.21
	Copper (Cu)	mg/kg	110^{α}	50	***66.5*** ± 7.4	38.2 ± 6.1	***101*** ± 5.6	49.8 ± 0.5
	Iron (Fe)	mg/kg	$40{,}000^{\alpha}$	52,400	29,840 ± 3,488	48,150 ± 8,692	***53,580*** ± 2,174	***61,633*** ± 8,732
	Lead (Pb)	mg/kg	91	35	***46.0*** ± 17.4	20.0 ± 1.8	29.5 ± 5.0	24.1 ± 1.0
	Lithium (Li)	mg/kg	-	-	27.3 ± 0.4	25.5 ± 3.3	41.7 ± 2.1	34.6 ± 1.7
	Magnesium (Mg)	mg/kg	-	-	10,852 ± 274	10,792 ± 1,375	16,160 ± 814	13,567 ± 240
	Manganese (Mn)	mg/kg	$1{,}100^{\alpha,\beta}$	4,370	496 ± 99	2,583 ± 758	1,866 ± 449	2,307 ± 1,583
	Mercury (Hg)	mg/kg	0.486	0.17	0.0355 ± 0.0063	0.0368 ± 0.0064	0.0699 ± 0.0019	0.0555 ± 0.0032
	Molybdenum (Mo)	mg/kg	-	-	2.19 ± 0.49	2.64 ± 0.83	3.27 ± 0.34	1.78 ± 0.62
	Nickel (Ni)	mg/kg	$75^{\alpha,\beta}$	72	38.6 ± 1.6	64.7 ± 9.0	56.3 ± 2.6	69.7 ± 2.8
	Phosphorus (P)	mg/kg	$2{,}000^{\alpha}$	1,580	840 ± 47	1,521 ± 256	1,121 ± 57	***2,137*** ± 428
	Potassium (K)	mg/kg	-	-	3,894 ± 172	3,383 ± 428	5,891 ± 281	4,773 ± 205
	Selenium (Se)	mg/kg	-	-	0.49 ± 0.06	0.39 ± 0.05	0.85 ± 0.06	0.54 ± 0.04
	Silver (Ag)	mg/kg	-	-	0.12 ± 0.01	0.11 ± 0.00	0.27 ± 0.01	0.15 ± 0.01
	Sodium (Na)	mg/kg	-	-	296 ± 29	152 ± 19	455 ± 24	274 ± 23
	Strontium (Sr)	mg/kg	-	-	11.4 ± 0.5	8.9 ± 1.0	15.8 ± 0.6	15.4 ± 2.3
	Sulphur (S)	mg/kg	-	-	<5,000 ± 0	<5,000 ± 0	<5,000 ± 0	<5,000 ± 0
	Thallium (Tl)	mg/kg	-	-	0.388 ± 0.021	0.475 ± 0.075	0.801 ± 0.035	0.504 ± 0.069
	Tin (Sn)	mg/kg	-	-	56.3 ± 28.9	5.7 ± 1.4	16.3 ± 7.8	3.3 ± 0.9
	Titanium (Ti)	mg/kg	-	-	1,072 ± 36	733 ± 89	1,331 ± 69	877 ± 53
	Uranium (U)	mg/kg	-	-	11.9 ± 1.5	5.05 ± 1.0	27.3 ± 1.5	7.20 ± 0.1
	Vanadium (V)	mg/kg	-	-	50.0 ± 1.3	47.9 ± 6.1	72.0 ± 3.6	62.6 ± 1.0
	Zinc (Zn)	mg/kg	315	135	73.7 ± 2.7	47.4 ± 6.3	105 ± 5.1	61.9 ± 1.8
	Zirconium (Zr)	mg/kg	-	-	4.3 ± 0.6	4.1 ± 1.0	4.0 ± 0.2	5.2 ± 0.8

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2016) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2016)).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, baseline sediment quality data, and method detection limits. The indicated values are specific to Camp Lake.

(shaded box) Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

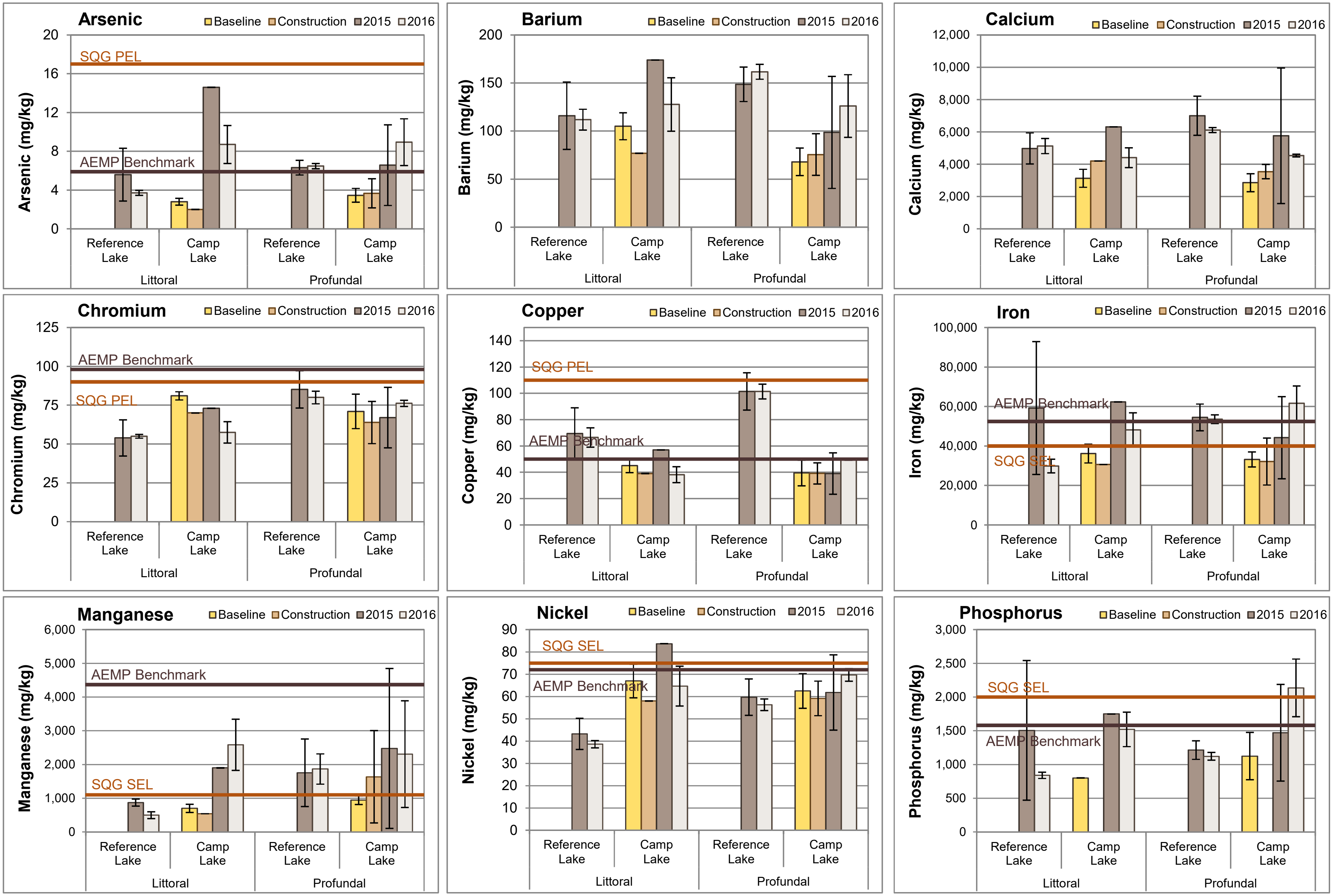

Figure 3.12: Temporal comparison of sediment metal concentrations (mean ± SD) at littoral and profundal stations of Camp Lake and Reference Lake 3 for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods, Mary River Project CREMP.

Table D.10). In part, the changes in sediment metal concentrations may have reflected changes in the number and/or location of littoral and profundal sediment quality monitoring stations at Camp Lake among studies. For instance, Station JLO-2 represented the only littoral station in Camp Lake during the baseline, 2014 and 2015 studies, and only the three deepest profundal stations were maintained in the 2016 study compared to previous studies that included up to nine profundal stations. The occurrence of Camp Lake sediment metal concentrations more closely reflecting those of the reference lake during mine operation (i.e., 2015, 2016) than during the mine baseline period was consistent with changes that may be expected from increased/decreased sampling replication at Camp Lake. Notwithstanding uncertainty related to changes in station replication among studies at Camp Lake, and taking reference lake sediment metal concentrations into account, higher concentrations of arsenic and manganese in littoral sediments of Camp Lake since the baseline period potentially reflected recent mine construction and/or operation influences to the lake shallows. In contrast, metals in Camp Lake profundal sediments showed no definitive changes in concentrations since the mine baseline period.

3.2.3 Phytoplankton

Camp Lake chlorophyll a concentrations showed no distinct gradients with distance from the CLT inlet to the lake outlet stations during any of the winter, summer or fall sampling events in 2016, although concentrations were somewhat lower at stations near the lake outlet during the summer and winter sampling events (Figure 3.13). Chlorophyll a concentrations differed significantly among all seasons at Camp Lake in 2016, with highest and lowest concentrations observed in summer and winter, respectively (Appendix Table E.4), and mirroring seasonal differences observed at the reference lake (Appendix Table B.8). On average, chlorophyll a concentrations at Camp Lake were significantly higher than at Reference Lake 3 during the summer and fall sampling events (Appendix Tables E.5 and E.6), suggesting greater phytoplankton density at Camp Lake. However, chlorophyll a concentrations were well below the AEMP benchmark of 3.7 µg/L during all winter, summer and fall sampling events in 2016 (Figure 3.13). Camp Lake mean chlorophyll a concentrations in 2016 suggested low phytoplankton productivity and an ‘oligotrophic’ trophic status based on Wetzel (2001) lake classification. This trophic status classification was also consistent with an ultra-oligotrophic to oligotrophic CWQG categorization for Camp Lake based on mean aqueous total phosphorus concentrations below 10 µg/L during all 2016 lake sampling events (Table 3.4; Appendix Table C.24).

Temporal comparisons of the Camp Lake chlorophyll a data did not indicate any consistent significant differences among the mine construction (2014) and operational (2015, 2016) years

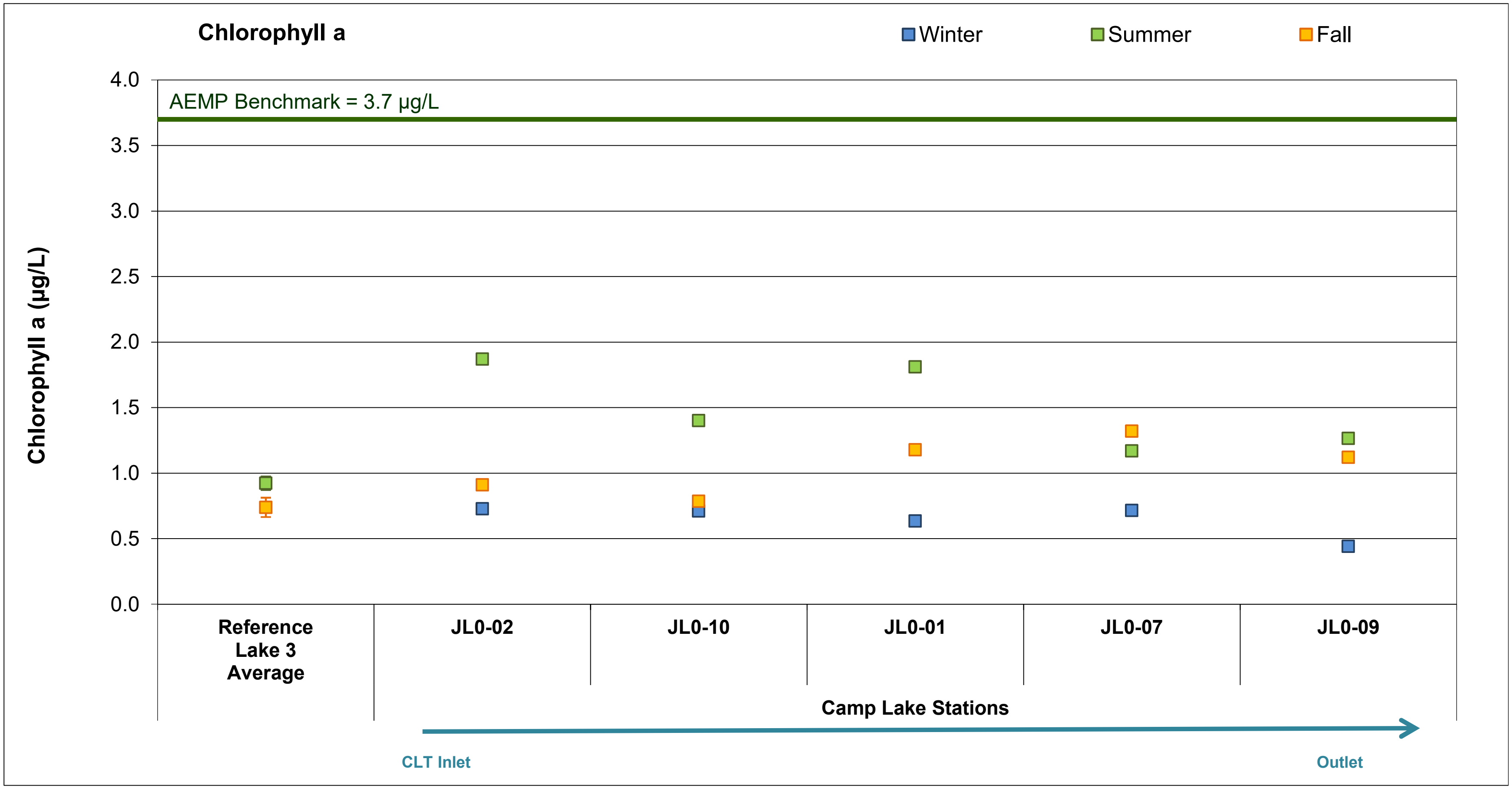

Figure 3.13: Chlorophyll a concentrations at Camp Lake (JLO) phytoplankton monitoring stations, Mary River Project CREMP, 2016. Values are averages of samples taken from the surface and the bottom of the water column at each station. Reference values represent mean ± standard deviation (n = 3). Reference Lake 3 was not sampled in winter 2016.

for seasonal data collected in winter, summer and fall (Figure 3.14). In addition, annual average chlorophyll a concentrations did not differ significantly among the most recent three years (Appendix Table E.7), suggesting no changes in the trophic status of Camp Lake since mine operations commenced at the Mary River Project. No chlorophyll a baseline (2005 – 2013) data are available for Camp Lake, precluding comparisons to conditions prior to the mine construction period.

3.2.4 Benthic Invertebrate Community

Benthic invertebrate community density and richness at littoral habitat of Camp Lake did not differ significantly from Reference Lake 3 in 2016 (Table 3.6). Simpson's Evenness was significantly higher at Camp Lake than at the reference lake in 2016, indicating that organism numbers were more uniformly distributed across a diversity of taxa at Camp Lake. Although a high Simpson's Evenness is generally indicative of healthy benthic invertebrate community conditions, the magnitude of difference in Simpson's Evenness between lakes was within a critical effect size (CES_{BIC}) of ±2 reference area standard deviations (SD_{REF}), suggesting that this difference was not ecologically meaningful. Benthic invertebrate community composition differences were evident between Camp Lake and Reference Lake 3 littoral habitat based on significantly higher Bray-Curtis Index at Camp Lake, and by significant differences in the relative abundance of dominant taxonomic groups and HPG between lakes (Table 3.6). The key differences in community structure included significantly lower relative abundance of Ostracoda (seed shrimp) and significantly higher relative abundance of Chironomidae (non-biting midges) at Camp Lake compared to the reference lake. However, because the relative abundance of metal-sensitive Chironomidae did not differ significantly between Camp Lake and Reference Lake 3 (Table 3.6), the difference in benthic invertebrate community structure between lakes was not suggestive of adverse metal-related influences at Camp Lake. This was supported by water quality monitoring data that showed aqueous metal concentrations were below WQG and AEMP benchmarks at Camp Lake, and by sediment quality monitoring data that showed sediment metal concentrations were below SQG at Camp Lake with the exception of iron and manganese, which were also above SQG at Reference Lake 3.

Benthic invertebrate community compositional differences between the Camp Lake and Reference Lake 3 littoral stations did not appear to reflect differing food resources between lakes given an absence of significant differences in FFG (Table 3.6). Although the relative abundance of benthic invertebrate HPG differed significantly between Camp Lake and the reference lake, the magnitude of these differences were within a CES_{BIC} of ±2 SD_{REF} (Table 3.6) suggesting that the dissimilarity in the benthic invertebrate HPG proportions between lakes was within natural ranges of ecological variability. Notably, sediment particle

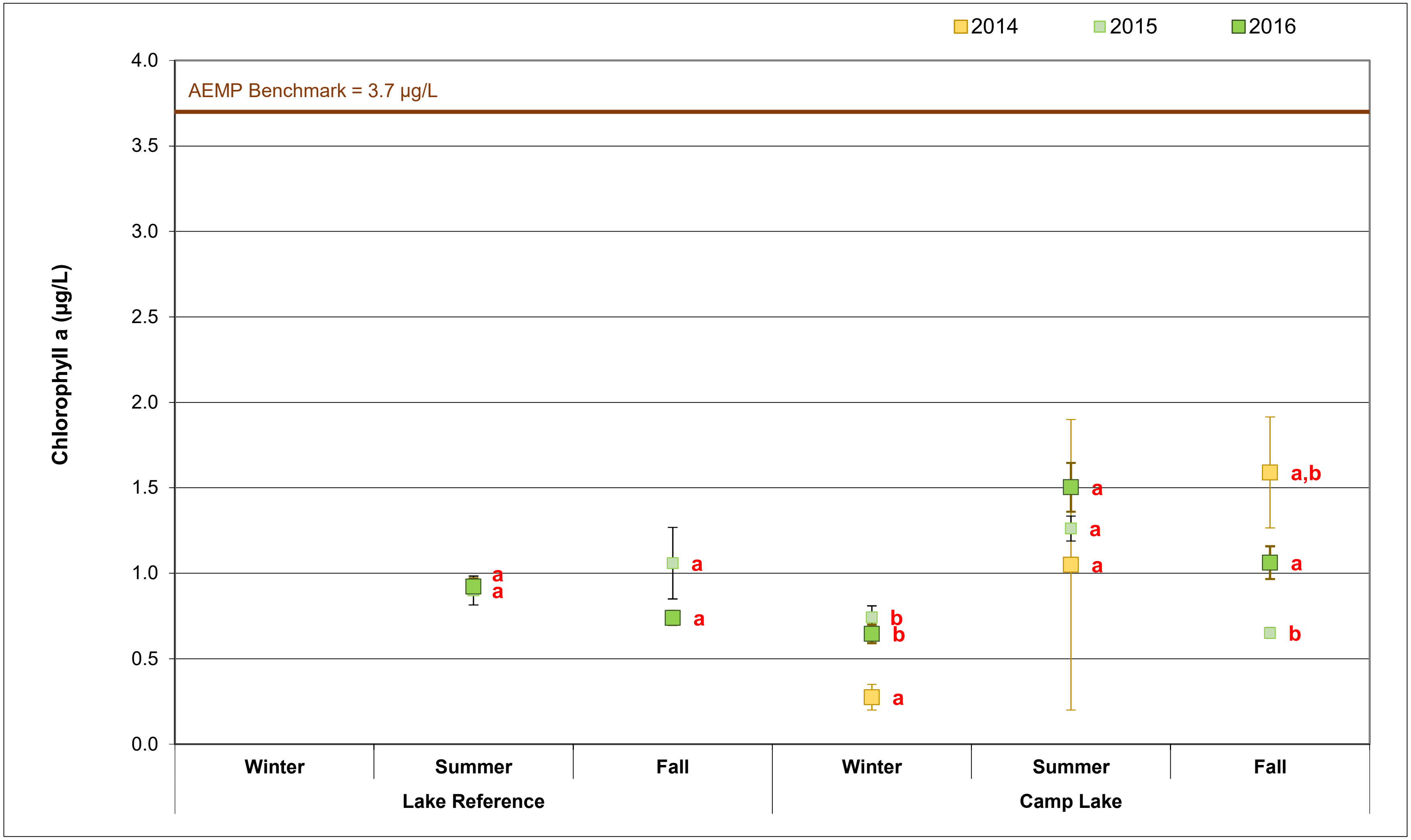

Figure 3.14: Chlorophyll a concentration seasonal comparison among 2014, 2015 and 2016 years (mean ± SE) at Camp Lake phytoplankton monitoring stations, Mary River Project CREMP. Data points with the same letter on the right do not differ significantly between years for the applicable season.

Table 3.6: Benthic invertebrate community statistical comparison results between Camp Lake (JLO) and Reference Lake 3 littoral stations, Mary River Project CREMP, August 2016.

Metric	Statistical Test Results					Summary Statistics					
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Power	Magnitude of Difference [b] (No. of SD)	Area	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Maximum
Density (Individuals/m^2)	No	0.728	α, δ, γ	-	-	Reference Lake 3	2,390	1,396	624	897	4,240
						Camp Lake Littoral	2,639	668	299	1,825	3,343
Richness (Number of Taxa)	No	0.151	γ	-	-	Reference Lake 3	12.2	1.1	0.5	11.0	14.0
						Camp Lake Littoral	15.8	3.3	1.5	10.0	18.0
Simpson's Evenness (E)	**Yes**	**0.008**	γ	**-**	**0.8**	Reference Lake 3	0.758	0.189	0.084	0.420	0.849
						Camp Lake Littoral	0.917	0.034	0.015	0.869	0.951
Bray-Curtis Index	Yes	0.001	α, δ, γ	1.000	2.8	Reference Lake 3	0.334	0.122	0.054	0.245	0.527
						Camp Lake Littoral	0.677	0.069	0.031	0.576	0.744
Nemata (%)	No	0.436	β, δ, γ	-	-	Reference Lake 3	4.0%	5.6%	2.5%	0.0%	13.5%
						Camp Lake Littoral	4.4%	4.8%	2.2%	1.0%	11.9%
Hydracarina (%)	No	0.182	β, ε	-	-	Reference Lake 3	3.6%	2.0%	0.9%	1.8%	6.7%
						Camp Lake Littoral	2.4%	3.1%	1.4%	0.0%	7.1%
Ostracoda (%)	Yes	0.008	γ	-	-2.6	Reference Lake 3	46.9%	17.5%	7.8%	37.8%	78.0%
						Camp Lake Littoral	1.8%	1.1%	0.5%	0.0%	2.8%
Chironomidae (%)	Yes	0.002	β, δ, γ	0.993	2.2	Reference Lake 3	45.4%	18.8%	8.4%	15.4%	59.2%
						Camp Lake Littoral	87.4%	7.0%	3.1%	78.6%	95.9%
Metal-Sensitive Chironomidae (%)	No	0.149	β, δ, γ	-	-	Reference Lake 3	19.3%	8.3%	3.7%	7.7%	28.1%
						Camp Lake Littoral	29.7%	11.8%	5.3%	16.2%	46.8%
Collector-Gatherers (%)	No	0.155	β, δ, γ	-	-	Reference Lake 3	75.0%	11.4%	5.1%	61.1%	89.7%
						Camp Lake Littoral	65.7%	7.8%	3.5%	52.4%	71.5%
Filterers (%)	No	0.103	β, δ, γ	-	-	Reference Lake 3	16.1%	8.4%	3.8%	7.0%	26.4%
						Camp Lake Littoral	25.0%	7.5%	3.3%	16.2%	36.5%
Clingers (%)	**Yes**	**0.093**	β, δ	**0.539**	**1.6**	Reference Lake 3	19.2%	7.6%	3.4%	8.8%	28.3%
						Camp Lake Littoral	31.5%	12.2%	5.4%	17.5%	45.3%
Sprawlers (%)	**Yes**	**0.026**	β, δ, γ	**0.803**	**-1.9**	Reference Lake 3	65.7%	12.1%	5.4%	57.2%	85.7%
						Camp Lake Littoral	42.7%	12.5%	5.6%	23.1%	54.8%
Burrowers (%)	**Yes**	**0.053**	β, δ, γ	**0.667**	**1.7**	Reference Lake 3	15.1%	6.2%	2.8%	5.5%	22.2%
						Camp Lake Littoral	25.6%	7.2%	3.2%	19.1%	35.1%

[a] Data analysis included: α - data untransformed; β - data logit transformed; ι - log_{10} transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

[b] Magnitude calculated by comparing the difference between the reference area and mine-exposed area means divided by the reference area standard deviation.

[c] Estimated minimum effect size detectable (±) calculated using variance as square root of MSE from ANOVA and alpha = beta = 0.10.

(grey box) Highlighted values indicate significant differences between study areas based on ANOVA p-value less than 0.10 that were also outside of a Critical Effect Size of ±2 SD, suggesting an ecologically meaningful difference.

BOLD Bold text values indicate significant differences between study areas based on ANOVA p-value less than 0.10, but a Critical Effect Size within ±2 SD, suggesting the difference is not ecologically meaningful.

size did not differ significantly between the Camp Lake and reference lake littoral stations (Appendix Table D.8), suggesting that the differences in benthic invertebrate HPG between lakes were also not related to differing substrate texture as an artifact of the sampling program. Collectively, the lack of significant differences in FFG and ecologically meaningful differences in HPG suggested that benthic invertebrate community structural differences between Camp Lake and Reference Lake 3 littoral stations may have simply reflected natural variability between these lakes.

Temporal comparisons of the Camp Lake littoral habitat benthic invertebrate community indicated no significant differences in density, richness, dominant taxonomic group composition or FFG composition between the mine baseline (2013) and operational (2015, 2016) periods (Figure 3.15; Appendix Table F.19). Although Simpson's Evenness was significantly lower at Camp Lake littoral stations in 2015 than during either of the 2013 and 2016 studies (Figure 3.15), high Simpson's Evenness in 2016 and the absence of differences in any of the remaining key indices suggested that low evenness in 2015 did not reflect a mine-related influence. Thus, the study-to-study differences in Simpson's Evenness most likely reflected natural year-to-year variability in benthic invertebrate community features at Camp Lake. No consistent differences in benthic invertebrate community density, richness, Simpson's Evenness, FFG or HPG were indicated between Camp Lake and Reference Lake 3 littoral stations over the 2015 and 2016 studies (Figure 3.15; Appendix Table F.19). This supported the baseline data analyses in suggesting that the indicated differences for select metrics in 2015 and 2016 between the Camp Lake and reference lake benthic invertebrate communities were related to natural ecological variability rather than a mine-related influence.

3.2.5 Fish Population

3.2.5.1 Camp Lake Fish Community

The Camp Lake fish community included Arctic charr (*Salvelinus alpinus*) and ninespine stickleback (*Pungitius pungitius*), which mirrored the fish species composition observed at Reference Lake 3 in 2016 (Table 3.7). A higher density of Arctic charr was suggested at Camp Lake compared to Reference Lake 3 based on greater electrofishing total catch-per-unit-effort (CPUE) from shallow rocky nearshore habitat, and on greater gill netting CPUE from deeper littoral/profundal habitat at Camp Lake in 2016 (Table 3.7). In turn, this suggested higher fish productivity at Camp Lake compared to Reference Lake 3, corroborating the chlorophyll a results which indicated higher phytoplankton productivity at Camp Lake. Notably, although ninespine stickleback have been presumed to reside in low abundance at most lakes within the mine LSA (NSC 2014), the occurrence of ninespine stickleback at Camp Lake in 2016

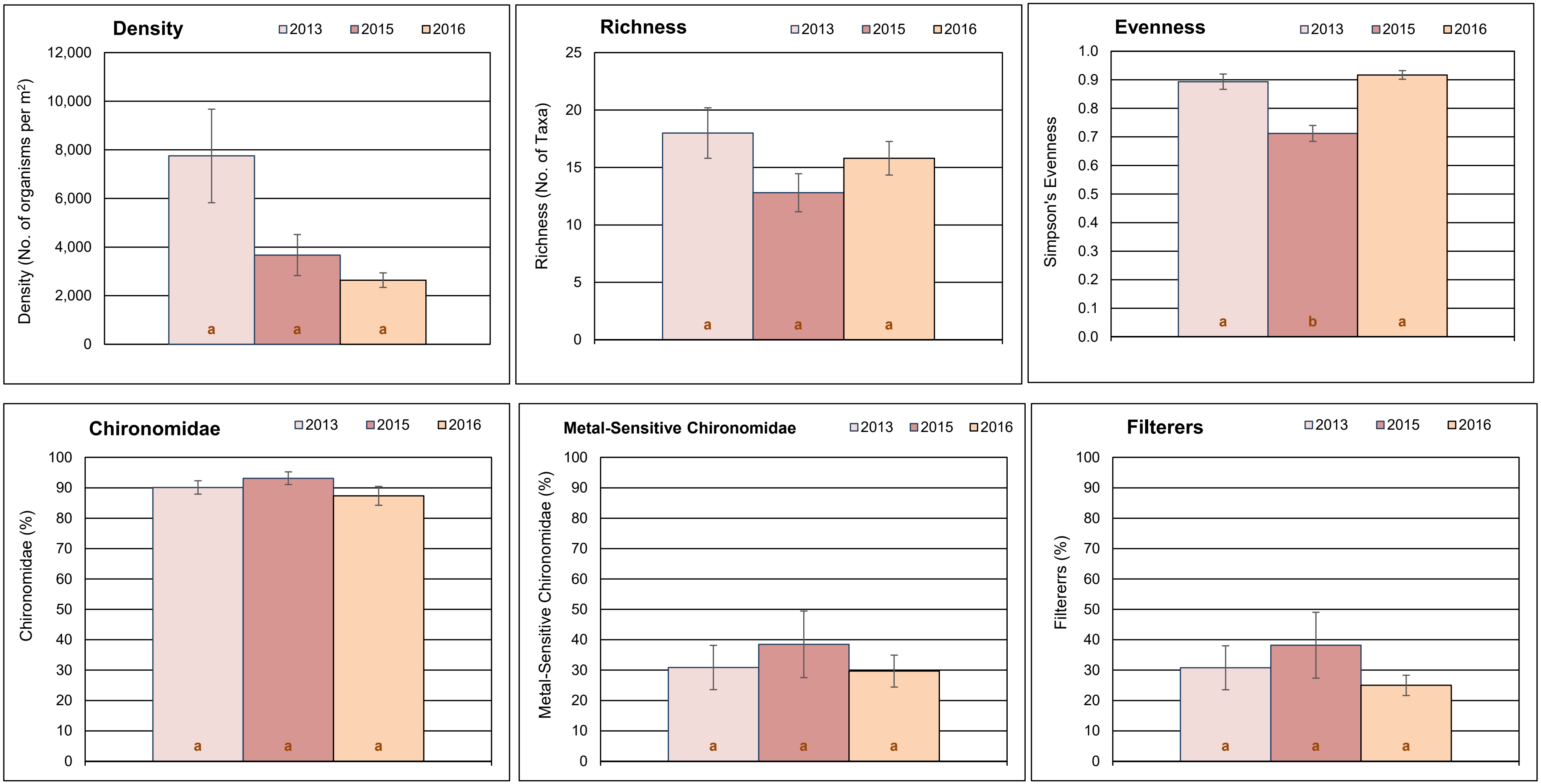

Figure 3.15: Comparison of key benthic invertebrate metrics (mean ± SE) at Camp Lake littoral stations between mine baseline (2007, 2013) and operational (2015, 2016) periods, Mary River Project CREMP, 2016. The same like-coloured letter inside bars indicate no significant difference between areas.

Table 3.7: Fish catch and community summary from backpack electrofishing and gill netting conducted at Camp Lake (JLO) and Reference Lake 3 (REF3), Mary River Project CREMP, August 2016.

Lake	Method [a]		Arctic Charr	Nine-spine Stickleback	Total by Method	Total No. of Species
Reference Lake 3	Electrofishing	No. Caught	101	28	129	2
		CPUE	0.48	0.16	0.64	
	Gill netting	No. Caught	14	0	14	
		CPUE	0.15	0	0.15	
Camp Lake	Electrofishing	No. Caught	98	2	100	2
		CPUE	6.24	0.13	6.37	
	Gill netting	No. Caught	89	0	89	
		CPUE	5.43	0	5.43	

[a] Catch-per-unit-effort (CPUE) for electrofishing represents the number of fish captured per electrofishing minute, and for gill netting represents the number of fish captured per 100 m hours of net.

marks the first record of this species in the lake since the implementation of the Mary River Project AEMP studies. Similar abundance of ninespine stickleback along rocky nearshore habitat was suggested at both lakes based on comparable electrofishing CPUE for this species in 2016 (Table 3.7).

The Camp Lake 2016 electrofishing CPUE for Arctic charr was within the range of that observed during baseline (2005 - 2013) studies (Figure 3.16). This suggested that the abundance of Arctic charr at nearshore habitat of Camp Lake in 2016 was comparable to abundance observed prior to mine start-up. The Arctic charr CPUE for gill net collections was markedly higher in the 2016 study than in all previous baseline (2006 – 2008), mine construction (2014) and mine operational (2015) studies (Figure 3.16). Higher Arctic charr CPUE in 2016 may have reflected a combination of greater sampling efficiency due to experience gained from previous studies (e.g., selection of netting locations), changes in sampling gear dimensions relative to previous studies (i.e., focus on most efficient net mesh sizes as per Minnow 2016b), differences in the amount of gill netting effort applied during each study (see Minnow 2016a) and/or natural factors (e.g., weather conditions). Nevertheless, CPUE comparisons among studies suggested that the relative abundance of Arctic charr in Camp Lake had not likely changed substantially, and was not lower, in 2016 compared to the baseline and mine-construction periods.

3.2.5.2 Camp Lake Fish Population Assessment

Nearshore Arctic Charr

Mine-related influences on the Camp Lake nearshore Arctic charr population (i.e., fish captured by electrofishing) were assessed based on a control-impact analysis using 2016 data from Camp Lake and Reference Lake 3, as well as a before-after analysis using Camp Lake 2016 and baseline (2013) data. A total of 98 and 100 Arctic charr were captured at nearshore habitat of Camp Lake and Reference Lake 3, respectively, in August 2016, for the control-impact analysis. Young-of-the-year (YOY) were distinguished from older (non-YOY) age classes at a fork length cut-off of 3.9 and 5.1 cm for the Camp Lake and Reference Lake 3 data sets, respectively, based on the evaluation of length-frequency distributions coupled with supporting age determinations (Figure 3.17). Due to a low number of Arctic charr YOY captured at Camp Lake (i.e., 4), fish population comparisons were conducted using only non-YOY individuals, where applicable, to limit confounding influences of naturally differing weight-at-length relationships between YOY and non-YOY individuals on data interpretation.

The length-frequency distribution for the nearshore Arctic charr differed significantly between Camp Lake and Reference Lake 3 (Table 3.8), reflecting the occurrence of very few YOY and

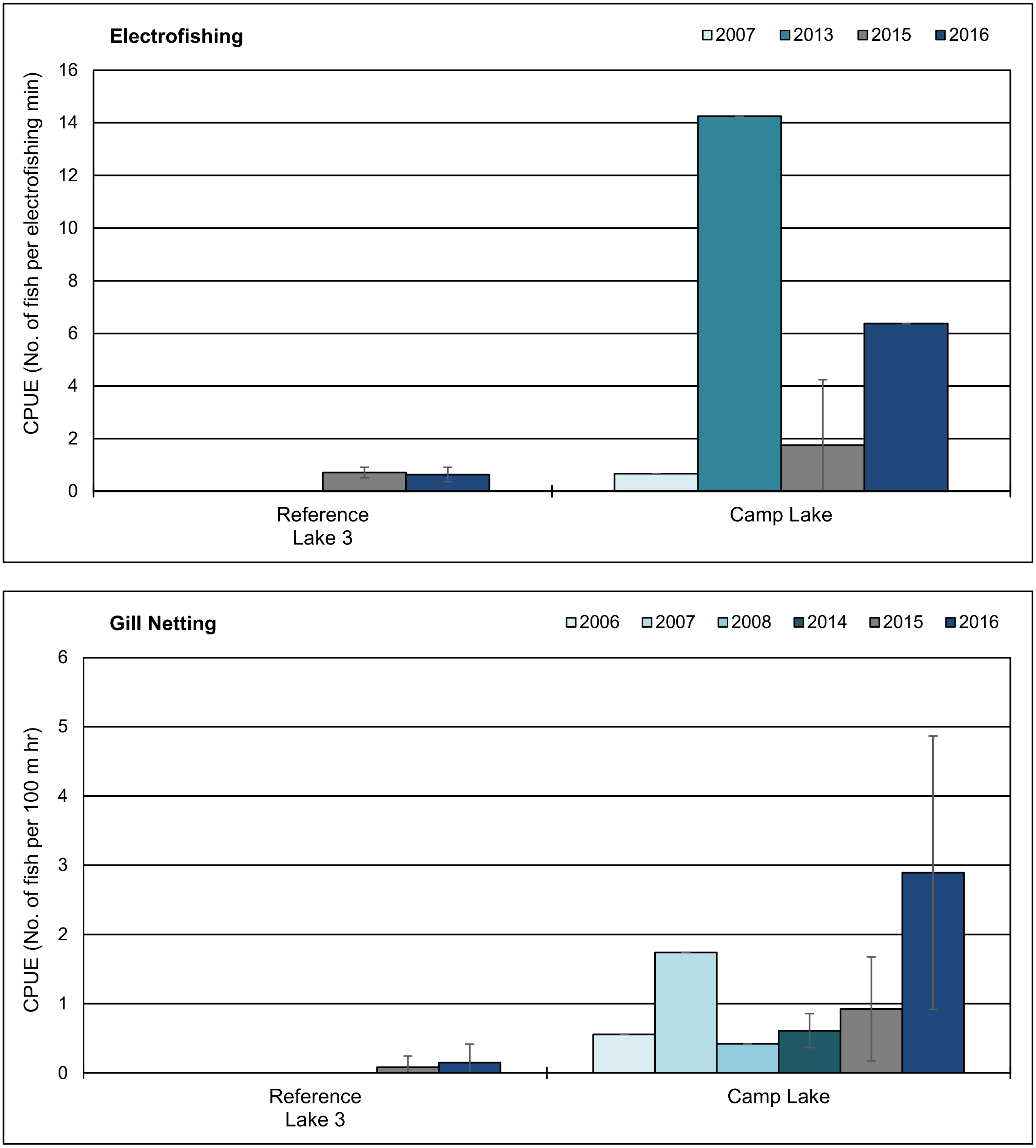

Figure 3.16: Catch-per-unit-effort (CPUE; mean ± SD) of Arctic charr captured by backpack electrofishing and gill netting at Camp Lake (JLO) for baseline (2006, 2007, 2008, 2013), mine construction (2014) and operational (2015, 2016) periods during fall, Mary River Project CREMP.

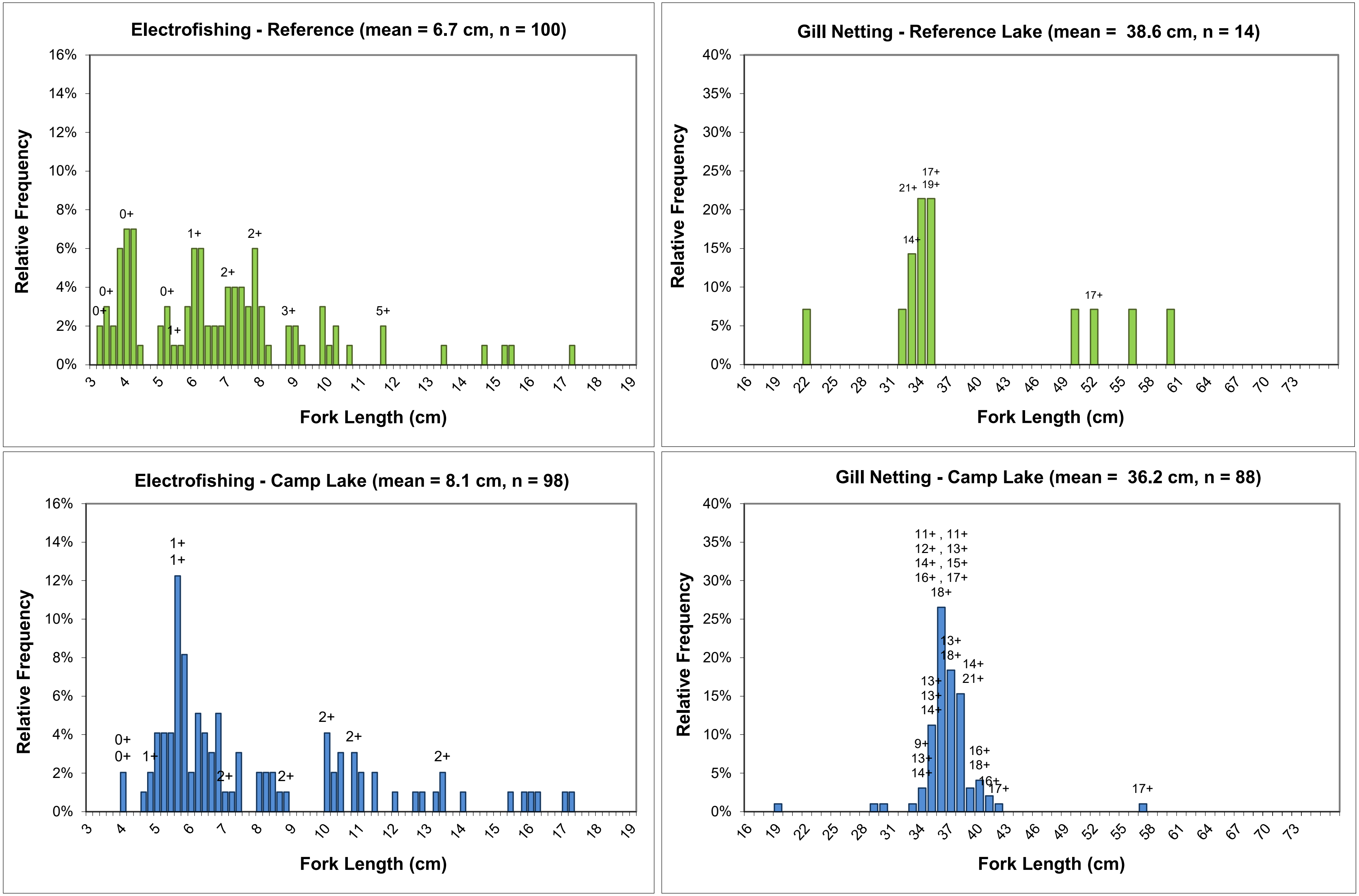

Figure 3.17: Length-frequency distributions for Arctic charr captured by backpack electrofishing and gill netting at Camp Lake (JLO) and Reference Lake 3 (REF3), August 2016, Mary River Project CREMP. Fish ages are shown above the bars, where available.

Table 3.8: Summary of statistical results for Arctic charr population comparisons between Camp Lake and Reference Lake 3 for the mine operational period (2015, 2016) and between Camp Lake mine-operational and baseline period data for fish captured by electrofishing and gill netting methods, Mary River Project CREMP, August 2016. Values in parentheses indicate direction and magnitude of any significant differences.

Data Set by Sampling Method	Response Category	Endpoint	Statistically Significant Differences Observed?			
			versus Reference Lake 3		versus Camp Lake baseline period data [b]	
			2015	2016	2015	2016
Nearshore Electrofishing	Survival	Length-Frequency Distribution	**Yes**	**Yes**	**Yes**	**Yes**
		Age	No	No	-	-
	Energy Use	Size (mean weight)	**Yes (+176%)**	No	**Yes (-42%)**	**Yes (-71%)**
		Size (mean fork length)	**Yes (+41%)**	No	**Yes (-15%)**	**Yes (-32%)**
		Growth (weight-at-age)	**Yes (+154%)**	No	-	-
		Growth (fork length-at-age)	**Yes (+36%)**	**Yes (+18%)**	-	-
	Energy Storage	Condition (body weight-at-fork length)	No	**Yes (-6%)**	**Yes (-6%)**	**Yes (-10%)**
Littoral/Profundal Gill Netting [a]	Survival	Length Frequency Distribution	-	-	**Yes**	**Yes**
		Age	-	-	**Yes (+48%)**	**Yes (+58%)**
	Energy Use	Size (mean weight)	-	-	No	No
		Size (mean fork length)	-	-	**Yes (+6%)**	No
		Growth (weight-at-age)	-	-	No	**Yes (nc)**
		Growth (fork length-at-age)	-	-	No	**Yes (nc)**
	Energy Storage	Condition (body weight-at-fork length)	-	-	No	**Yes (-3%)**

[a] Due to low catches of Arctic charr at Reference Lake 3 in 2015 and 2016, no comparison of fish health was possible for gill netted fish.
[b] Baseline period data included 2013 nearshore electrofishing data and 2006, 2008 and 2013 littoral/profundal gill netting data. nc = non-calculable magnitude.

greater numbers of larger individuals captured at Camp Lake. Mean fresh body weight and fork length of non-YOY Arctic charr captured at the Camp Lake nearshore did not differ significantly from those captured at the reference lake nearshore (Table 3.8; Appendix Table G.11). Non-YOY Arctic charr captured at the Camp Lake nearshore exhibited significantly faster length-based growth (i.e., length-at-age) compared to non-YOY captured at Reference Lake 3 (Table 3.8; Figure 3.17; Appendix Table G.11). However, the magnitude of difference in growth was within an ecologically meaningful Critical Effect Size (CES) of ±25% (referred to herein as CES_G; Table 3.8), suggesting that the differences in non-YOY Arctic charr energy use between lakes was within the range of variability expected to occur naturally between waterbodies uninfluenced by human activity. Notably, sample sizes used for growth comparisons were small (i.e., ten for each study area; Appendix Table G.11), resulting in some uncertainty regarding the strength of the indicated growth relationships. Non-YOY Arctic charr condition (i.e., weight-at-length relationship) was significantly lower at Camp Lake than at the reference lake (Table 3.8; Appendix Table G.11). Similar to the growth analysis, the magnitude of difference in condition of non-YOY Arctic charr between lakes was within a CES of ±10% (referred to herein as CES_C; Table 3.8), suggesting that the difference in non-YOY Arctic charr energy storage between lakes was not ecologically meaningful. Collectively, the 2016 fish health assessment results suggested only minor differences in nearshore Arctic charr energy use and storage between Camp Lake and Reference Lake 3 populations, the implications of which were not likely to be ecologically meaningful.

Temporal comparisons of the Camp Lake nearshore Arctic charr data indicated significantly different length-frequency distribution between the 2016 mine operational study and the 2013 baseline study (Table 3.8). In addition, Arctic charr captured at the nearshore of Camp Lake in 2016 were significantly lighter, shorter and of lower condition than those captured during the 2013 baseline study (Table 3.8; Appendix Table G.12). Similar differences in nearshore Arctic charr size and condition were demonstrated between the 2015 mine operational study and the 2013 baseline data (Table 3.8). However, the magnitude of difference in condition between the individual mine operational studies (i.e., 2015 and 2016) and the 2013 baseline data was within a CES_C of ±10% (Table 3.8; Appendix Table G.12), suggesting that the differences were within the natural range of variability expected between lakes uninfluenced by human activity.

Littoral/Profundal Arctic Charr

Mine-related influences on the Camp Lake littoral/profundal Arctic charr population (i.e., fish captured by gill netting) was assessed using a before-after analysis of Camp Lake 2016 versus baseline (combined 2006, 2007, 2008 and 2013) data. Similar to the 2015 CREMP, despite a total of 87 Arctic charr captured at littoral/profundal areas of Camp Lake and application of similar fishing effort, the Arctic charr sample size was small (i.e., 14) at Reference Lake 3 in August 2016, precluding a control-impact analysis for the determination of mine-related effects. Biological information collected from Arctic charr mortalities encountered during the 2016 Camp Lake littoral/profundal sampling suggested that 67% of the population was represented by non-spawners of reproductive age (referred to simply as non-spawners herein; Appendix Table G.15). The average age, length and weight of non-spawners was comparable to that of female spawners (Appendix Table G.15) indicating that, typical of high Arctic systems, individual Arctic charr do not spawn yearly at Camp Lake. Liver somatic index (LSI) was significantly lower in non-spawners than female spawners (ANOVA; $p = 0.004$), suggesting that lower energy was available for gamete development in the non-spawners. Internal body cavity parasites were present in almost all of the Arctic charr incidental mortalities (Appendix Table G.15), potentially contributing to biennial or longer frequency between spawning events for Arctic charr in the mine LSA lakes as a result of lower energy applied towards gamete production stemming from the parasitic infection. High incidence rates of internal parasites in Arctic charr of the Mary River Project mine area lakes was noted in baseline studies (NSC 2014, 2015a) and the 2015 CREMP (Minnow 2016a).

Temporal comparisons of Arctic charr data collected from Camp Lake littoral/profundal areas indicated significantly different length-frequency distribution of Arctic charr in 2016 compared to the combined baseline data set (i.e., 2006, 2007, 2008 and 2013 studies; Table 3.8). The differences in length-frequency distributions were consistent with the capture of significantly older Arctic charr at Camp Lake in 2016 compared to the baseline period (Table 3.8; Appendix Table G.16). No significant differences in Arctic charr fresh body weight or fork length were demonstrated between the 2016 and the baseline period. Arctic charr of spawning size showed significant differences in growth between 2016 and the baseline period, although the magnitude and direction of difference was non-calculable due to a significant interaction result (Table 3.8). Finally, significantly lower condition was indicated for Arctic charr of spawning size at Camp Lake between 2016 and the baseline period, but the magnitude of this difference was very small and within the CES_C of ±10% (Table 3.8; Appendix Table G.16), suggesting that this difference was not ecologically meaningful. Although length frequency distribution and average age of Arctic charr captured at Camp Lake in 2015 and 2016 consistently differed from those of the baseline period, no consistent differences in size, growth or condition were demonstrated between individual mine operational years and the baseline period.

3.3 Synthesis of Mine-Related Influences within the Camp Lake System

3.3.1 Camp Lake Tributaries

3.3.1.1 Camp Lake Tributary 1

Mine-related effects on water quality of the CLT1 north branch in 2016 included slightly elevated nitrate and copper concentrations compared to 2016 reference creek data and to 2005 - 2013 baseline data. Despite copper concentrations above WQG, chlorophyll a concentrations (a surrogate for phytoplankton abundance) at the CLT1 north branch were comparable to those of the reference creek stations in 2016, and to those during the baseline period, all of which were well below the AEMP benchmark and suggested oligotrophic conditions typical of Arctic watercourses. In addition, despite some differences in benthic invertebrate community composition between the CLT1 north branch and the reference creek in 2016, these differences appeared to be related to naturally differing amounts of in-stream vegetation between watercourses. This was supported by the absence of differences in relative abundance of metal-sensitive taxa between the CLT1 north branch and Unnamed Reference Creek in 2016, and for CLT1 north branch data collected in 2016 compared to 2005 - 2013 baseline data. Moreover, temporal comparisons that indicated no consistent differences in primary benthic invertebrate community endpoints (i.e., density, richness, Simpson's Evenness) or relative abundance of dominant invertebrate groups and FFG in 2016 compared to baseline data. Therefore, similar to the findings of the 2015 CREMP, no adverse effects to biota of the CLT1 north branch were suggested by the 2016 study.

At the CLT1 upper main stem (Station L2-03), mine-related influences on water quality were evident as elevated conductivity, hardness and concentrations of nitrate, sulphate and several metals including iron, manganese, molybdenum, sodium, strontium and uranium in 2016 compared to 2016 reference creek station data and to 2005 - 2013 baseline data. As identified during the 2015 CREMP, quarrying activity at the QMR2 pit was likely a key source for parameters elevated at the CLT1 main stem stations in 2016. Despite evidence of continued mine-related influence on water quality of the CLT1 upper main stem in 2016, parameter concentrations were below applicable WQG and site-specific AEMP benchmarks with the exception of iron and uranium at the upper main stem. However, elevated chlorophyll a concentrations and significantly higher benthic invertebrate density, richness and relative abundance of metal-sensitive taxa at the CLT1 upper main stem compared to Unnamed Reference Creek in 2016 suggested that concentrations of iron, uranium and other metals were not highly bioavailable at the CLT1 upper main stem. In fact, biological data collected at the CLT1 upper main stem in 2016 suggested a biological enrichment effect related to elevated nutrient concentrations. Temporal comparisons suggested that chlorophyll a concentrations at the CLT1 upper main stem were higher following commencement of mine operations than during the baseline period, but no significant differences in benthic invertebrate community primary endpoints, key dominant invertebrate groups, or FFG were evident between 2016 and baseline data collected in 2007. In turn, this suggested that mine-related enrichment effects at the CLT1 upper main stem, if any, were relatively minor.

At the CLT1 lower main stem (i.e., stations L1-01, L1-05 and L1-09), natural dilution of the main stem from the north branch resulted in only conductivity and aqueous concentrations of nitrate, chloride, manganese and strontium being elevated compared to concentrations observed at reference creek stations in 2016. Concentrations of all parameters were below applicable WQG and AEMP benchmarks at the CLT1 lower main stem in 2016. However, temporal comparisons suggested increased conductivity, hardness and concentrations of nitrate, sulphate and metals including iron, manganese, molybdenum, sodium, strontium and uranium during the 2015/2016 mine operation period compared to the 2005 - 2013 baseline period. Chlorophyll a concentrations at the CLT1 lower main stem in 2016 were comparable to those of the reference creek stations in 2016, and those observed during the baseline period. In all cases, chlorophyll a concentrations were well below the AEMP benchmark and suggested oligotrophic conditions typical of Arctic watercourses. No significant, ecologically meaningful, differences in benthic invertebrate community primary endpoints or relative abundance of metal-sensitive taxa were indicated at the CLT1 lower main stem between mine operation (2015, 2016) and baseline (2007, 2011) studies. Although benthic invertebrate community composition differed significantly between the CLT1 lower main stem and Unnamed Reference Creek communities in 2016, similar to the results of the 2015 CREMP, this appeared to be related to natural differences in dominant food source between the mine-exposed and reference study areas. No consistent types and/or direction of differences in the relative abundance of dominant groups or FFG were indicated between 2016 and the baseline data at the CLT1 lower main stem. Overall, no adverse mine-related effects to biota of the CLT1 lower main stem were suggested in 2016 based on comparison to Unnamed Reference Creek and baseline data.

3.3.1.2 Camp Lake Tributary 2

Mine-related effects on water quality of CLT2 in 2016 potentially included slightly elevated conductivity, sulphate and zinc concentrations based on comparisons to 2016 reference creek station data. However, water chemistry at CLT2 in 2016 was comparable to the 2005 - 2013 baseline data, suggesting that natural regional variability in water chemistry among lotic environments may have accounted for seemingly elevated concentrations of the aforementioned parameters at CLT2 in 2016 compared to the reference creek stations. Aqueous concentrations of all parameters were consistently well below established WQG and AEMP benchmarks at CLT2 during the 2015 and 2016 mine operation period. Chlorophyll a concentrations at CLT2 were consistently within the range observed among the reference creek stations in 2016 and, in addition to being well below the AEMP benchmark, were also within the range observed at CLT2 during baseline studies. Although the benthic invertebrate community of CLT2 exhibited significantly lower density and significantly different composition than Unnamed Reference Creek in 2016, these differences appeared to be related to natural habitat differences between watercourses. This was supported by no significant differences in richness, Simpson's Evenness and relative abundance of dominant invertebrate groups, FFG and HPG between areas located upstream and downstream of the mine tote road. In addition, no significant differences in benthic invertebrate community endpoints occurred between 2016 and the 2007 baseline data at either CLT2 study area with the exception of Simpson's Evenness, which was higher in 2016 and thus not consistent with a typical adverse mine-related response. Similar to the findings of the 2015 CREMP, the occurrence of few significant differences in benthic invertebrate community endpoints upstream and downstream of the mine tote road in 2016, and between the 2016 mine operational and 2007 baseline data, suggested no adverse mine-related influences to the benthic invertebrate community of CLT2.

3.3.2 Camp Lake

Mine-related influences on water quality of Camp Lake in 2016 included slightly elevated manganese concentrations compared to the reference lake, as well as slightly higher conductivity and concentrations of chloride, molybdenum, sodium, strontium and uranium compared to 2005 - 2013 baseline data. However, in all cases, parameter concentrations at Camp Lake were consistently well below WQG and AEMP benchmarks in 2015 and 2016. Sediment arsenic and manganese concentrations were elevated at Camp Lake littoral stations compared to the reference lake in 2016 and, together with molybdenum, were also elevated compared to concentrations during the baseline period. However, no metals were elevated in sediment at Camp Lake profundal stations compared to the reference lake in 2016. Although some changes in average sediment metal concentrations were suggested between 2016 and the baseline period at profundal stations, these changes may have reflected changes to the number of profundal sediment quality monitoring stations sampled between 2016 and the previous studies (i.e., three versus nine, respectively). Phosphorus was the only parameter observed at concentrations above SQG in littoral and profundal sediment of Camp Lake that was not also above applicable SQG at the reference lake. Overall, recent mine operations appeared to contribute to higher manganese and molybdenum concentrations in water and littoral sediment of Camp Lake, as well as higher chloride, sodium, strontium and uranium in water and potentially higher arsenic in littoral sediment, but concentrations of these parameters remained below applicable guidelines and AEMP benchmarks. In turn, this suggested a low potential for adverse effects to biota of Camp Lake.

Camp Lake chlorophyll a concentrations were significantly higher than at the reference lake in 2016 suggesting greater primary production at Camp Lake. However, Camp Lake chlorophyll a concentrations remained well below the AEMP benchmark during all seasonal sampling events in 2016, and suggested oligotrophic conditions typical of Arctic waterbodies. No significant differences in chlorophyll a concentrations were indicated among the mine construction (2014) and operational (2015, 2016) periods, suggesting no changes in the trophic status of Camp Lake since mine operations commenced at the Mary River Project. Benthic invertebrate community data collected at littoral habitat of Camp Lake in 2016 indicated significantly greater evenness and similar density, richness and relative abundance of metal sensitive taxa, FFG and HPG compared to the reference lake. In addition, no significant differences in benthic invertebrate community primary and FFG metrics were observed between 2016 and the 2013 baseline data for Camp Lake littoral stations. Analysis of Camp Lake Arctic charr populations suggested greater fish abundance compared to the reference lake in 2016, but similar numbers of Arctic charr in 2016 relative to the Camp Lake baseline studies. No significant, ecologically meaningful, differences in Arctic charr condition were indicated between Camp Lake and the reference lake in 2016, nor between Camp Lake Arctic charr collected in 2016 compared to the baseline period, for nearshore and littoral/profundal Arctic charr populations. Collectively, the chlorophyll a, benthic invertebrate community and Arctic charr fish population data all suggested no adverse mine-related influences to the biota of Camp Lake in the second year of mine operation at the Mary River Project.

4.0 SHEARDOWN LAKE SYSTEM

4.1 Sheardown Lake Tributaries (SDLT1, 9 and 12)

4.1.1 Water Quality

Sheardown Lake Tributary 1 (SDLT1) dissolved oxygen (DO) concentrations were consistently at or above saturation in spring, summer and fall monitoring events in 2016, and did not differ significantly from Unnamed Reference Creek at the time of biological sampling in August 2016 (Figure 4.1; Appendix Tables C.1 – C.3). Although DO saturation was slightly lower at Sheardown Lake Tributary 9 and 12 (SDLT9 and SDLT12, respectively) than at SDLT1 and Unnamed Reference Creek during August 2016 sampling, DO saturation at all of the Sheardown Lake tributaries was well above the WQG minimum limit for cold-water biota (i.e., 54%) during all seasonal sampling events (Figure 4.1; Appendix Tables C.1 – C.3). *In-situ* pH was significantly higher at SDLT1 compared to Unnamed Reference Creek, whereas pH at SDLT9 and SDLT12 did not differ significantly from reference conditions during the fall sampling event in 2016. Despite minor differences in pH among the Sheardown Lake tributaries, pH was consistently within WQG limits at each mine-exposed tributary and thus slight dissimilarity in pH among areas was unlikely to be ecologically meaningful. Conductivity at each of the Sheardown Lake tributaries was significantly higher than at Unnamed Reference Creek during the August 2016 biological sampling (Figure 4.1; Appendix Table C.29). Because conductivity often serves as an indication of mine-associated influences on water quality (e.g., Environment Canada 2012), these observations suggested a mine-related influence on water quality of the SDLT1, SDLT9 and SDLT12 watercourses.

Sheardown Lake Tributary 1 is the only tributary of the Sheardown Lake system at which routine water quality monitoring is conducted, with one monitoring station established in each of the upper and lower reaches of the tributary (i.e., Stations D1-05 and D1-00, respectively; Figure 2.2). Nitrate, sulphate and molybdenum concentrations were moderately to highly elevated (i.e., 5- to 10-fold, and ≥10-fold, respectively) at both SDLT1 stations compared to reference creek station mean concentrations at the time of fall sampling (Table 4.1). In addition, slightly elevated (i.e., 3- to 5-fold higher) concentrations of cadmium and copper were observed at upper SDLT1, and slightly elevated concentrations of chloride and manganese were observed at lower SDLT1, compared to reference creek stations at the time of fall sampling in 2016 (Table 4.1). Along with the aforementioned parameters, hardness, alkalinity and concentrations of TDS, potassium, sodium, strontium and uranium were generally elevated (i.e., ≥3-fold higher) in spring and/or summer at one or both SDLT1 monitoring stations compared to reference creek station mean values for each respective seasonal

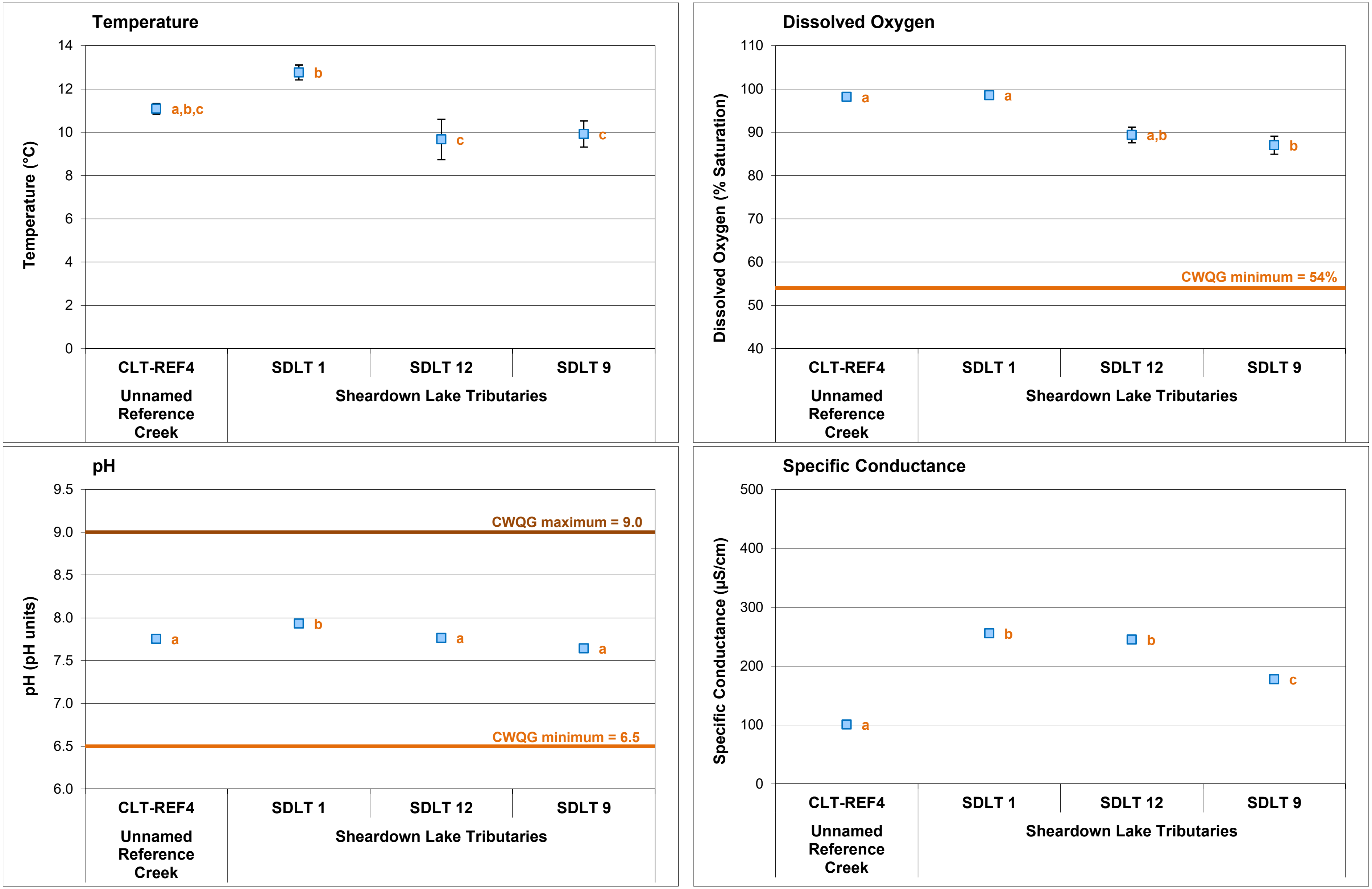

Figure 4.1: Comparison of *in-situ* water quality variables (mean ± SE; n = 5 except for SDLT 12, where n = 3) measured at the Sheardown Lake Tributaries (SDLT) and creek reference stations, Mary River Project CREMP, August 2016. The same letters next to data points indicate study area values do not differ significantly.

Table 4.1: Water chemistry at Sheardown Lake Tributary 1 (SDLT1) monitoring stations, Mary River Project CREMP, August 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Lotic Reference Average (n = 4)	Sheardown Lake Tributary 1	
						D1-05 (Upper)	D1-00 (Lower)
					Fall 2016	19-Aug-2016	19-Aug-2016
Conventionals[b]	Conductivity (lab)	umho/cm	-	-	125	232	308
	pH (lab)	pH	6.5 - 9.0	-	7.99	7.85	8.08
	Hardness (as $CaCO_3$)	mg/L	-	-	57.75	108	144
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	65	118	166
	Turbidity	NTU	-	-	1.10	0.27	0.65
	Alkalinity (as $CaCO_3$)	mg/L	-	-	57	83	114
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	0.030	<0.020
	Nitrate	mg/L	13	13	0.021	0.733	0.946
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.3	2.7	3.1
	Total Organic Carbon	mg/L	-	-	1.5	2.8	3.2
	Total Phosphorus	mg/L	0.020[α]	-	0.0059	0.0110	0.0032
	Phenols	mg/L	0.004[α]	-	0.0055	0.0110	0.0042
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.4975	6.41	9.47
	Sulphate (SO_4)	mg/L	218[β]	218	4.39	22.6	26.8
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0578	0.0082	0.0138
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00779	0.0115	0.0170
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00040	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.0003875	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	0.012	0.012
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	0.000037	0.000011
	Calcium (Ca)	mg/L	-	-	12.3	19.5	27.9
	Chromium (Cr)	mg/L	0.0089	0.00856	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	0.00011
	Copper (Cu)	mg/L	0.002	0.0022	0.0010	***0.00310***	***0.00222***
	Iron (Fe)	mg/L	0.30	0.326	0.051	<0.030	0.098
	Lead (Pb)	mg/L	0.001	0.001	0.000096	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	0.0013	0.0018
	Magnesium (Mg)	mg/L	-	-	6.77	14.1	18.9
	Manganese (Mn)	mg/L	0.935[β]	-	0.00086	0.000436	0.00559
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000380	0.00325	0.00243
	Nickel (Ni)	mg/L	0.025	0.025	0.00056	0.00114	0.00146
	Potassium (K)	mg/L	-	-	0.84	2.33	2.41
	Selenium (Se)	mg/L	0.001	-	<0.0007625	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.95	1.36	1.59
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000020	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.830	2.98	3.88
	Strontium (Sr)	mg/L	-	-	0.01240	0.0130	0.0169
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.0000775	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00799	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00366	0.00654	0.00532
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.000875	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.3 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data adopted from the Camp Lake Tributaries.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

sampling event (Appendix Table C.32). Despite elevation of these parameters at the SDLT1 stations compared to reference conditions, copper was the only parameter present at concentrations greater than respective WQG or AEMP benchmarks at either of the SDLT1 monitoring stations in 2016[7] (Table 4.1; Appendix Table C.30).

Temporal comparisons of SDLT1 water chemistry data indicated that, of the parameters shown to be elevated above average reference conditions, only nitrate and sulphate concentrations were slightly elevated (i.e., 3- to 5-fold higher) at upper and lower SDLT1 in 2016 compared to respective baseline period conditions (Figure 4.2; Appendix Table C.32 and Figure C.9). The SDLT1 concentrations of these parameters, and uranium, were elevated compared to baseline conditions in 2015 as well, suggesting a mine-related source of these metals since the initiation of mine operations at the Mary River Project.

4.1.2 Phytoplankton

Phytoplankton (chlorophyll a) monitoring is conducted only at SDLT1 within the Sheardown Lake system as part of the Mary River Project CREMP. Chlorophyll a concentrations at SDLT1 were lower at upstream-most Station D1-05 compared to near the creek mouth (Station D1- 00), during the spring and summer 2016 sampling events, but not during the fall (Figure 4.3). With the exception of markedly higher chlorophyll a concentrations near the SDLT1 creek mouth compared to reference conditions in summer, chlorophyll a concentrations were generally within the range shown among the reference creek stations and were well below the AEMP benchmark of 3.7 µg/L during all 2016 seasonal sampling events. Higher chlorophyll a concentrations observed near the mouth of SDLT1 may have reflected the occurrence of elevated nutrient concentrations, and aqueous nitrate concentrations specifically, shown at SDLT1 in 2016 (Section 4.1.1). Similar to the reference creek stations and Camp Lake tributary systems, chlorophyll a concentrations at SDLT1 were suggestive of low (i.e., oligotrophic) phytoplankton productivity based on Dodds et al (1998) trophic status classification for stream environments (i.e., chlorophyll a < 10 µg/L). Relatively low chlorophyll a concentrations at SDLT1 stations in 2016 were consistent with an oligotrophic WQG categorization based on aqueous phosphorus concentrations near or below 10 µg/L (Table 4.1; Appendix Table C.30).

Temporal comparisons indicated that chlorophyll a concentrations at SDLT1 stations in 2016 were comparable to concentrations measured during the baseline period (Figure 4.4). In addition, no consistent directional changes in chlorophyll a concentrations were shown at the

[7] Refer to footnote 2 (page 23) and Appendix B regarding phenol concentrations above WQG at the mine-exposed and reference areas of the Mary River Project LSA waterbodies.

Figure 4.2: Temporal comparison of water chemistry at Sheardown Lake Tributaries (SDLT) for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during fall. Values represent mean ± SD. Creek reference stations include the CLT-REF and MRY-REF series (mean ± SD; n = 4). Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.3 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are adopted from the Camp Lake Tributaries.

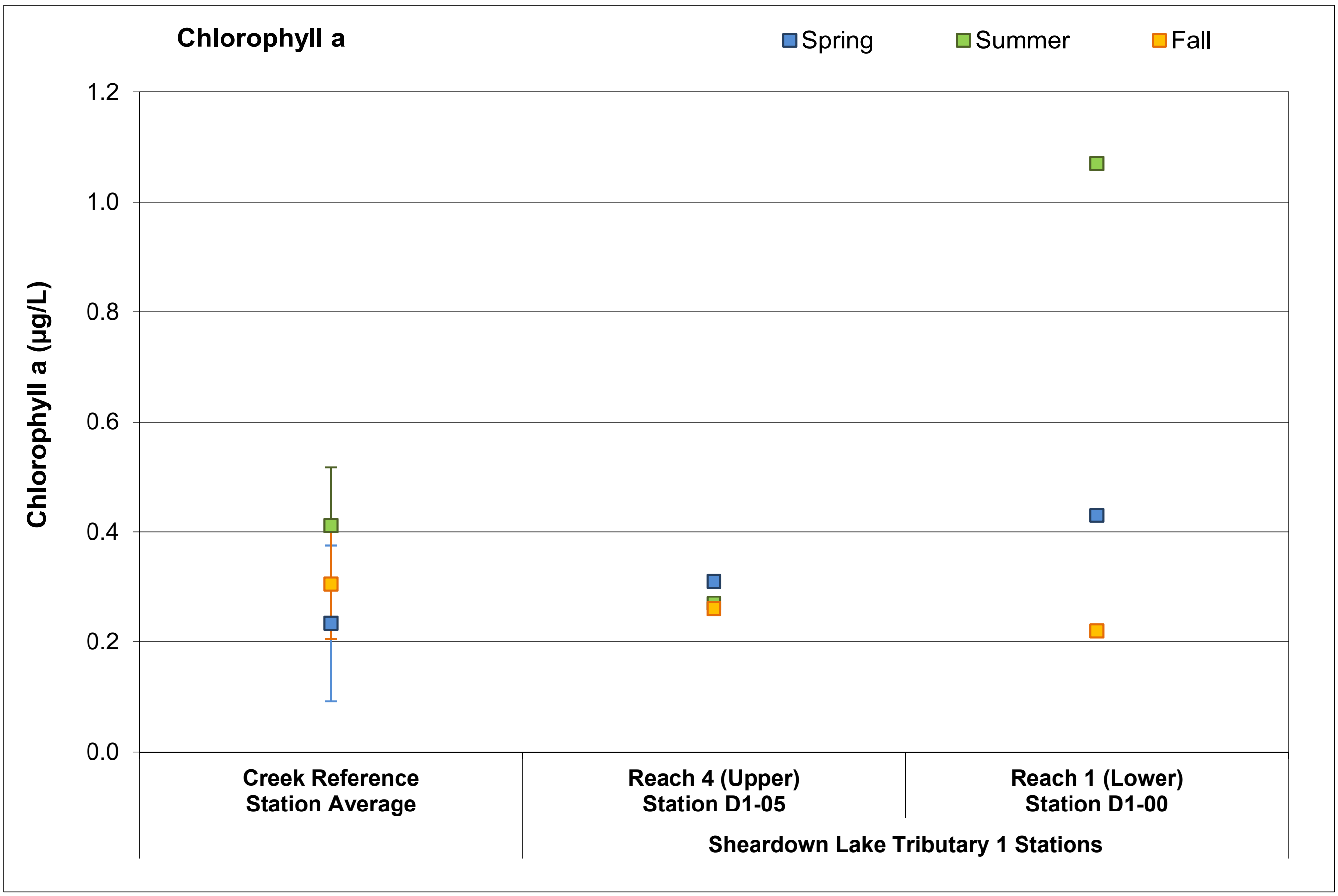

Figure 4.3: Chlorophyll a concentrations at Sheardown Lake Tributary 1 phytoplankton monitoring stations, Mary River Project CREMP, 2016. Creek reference includes the CLT-REF and MRY-REF series stations (mean ± SD; n = 4).

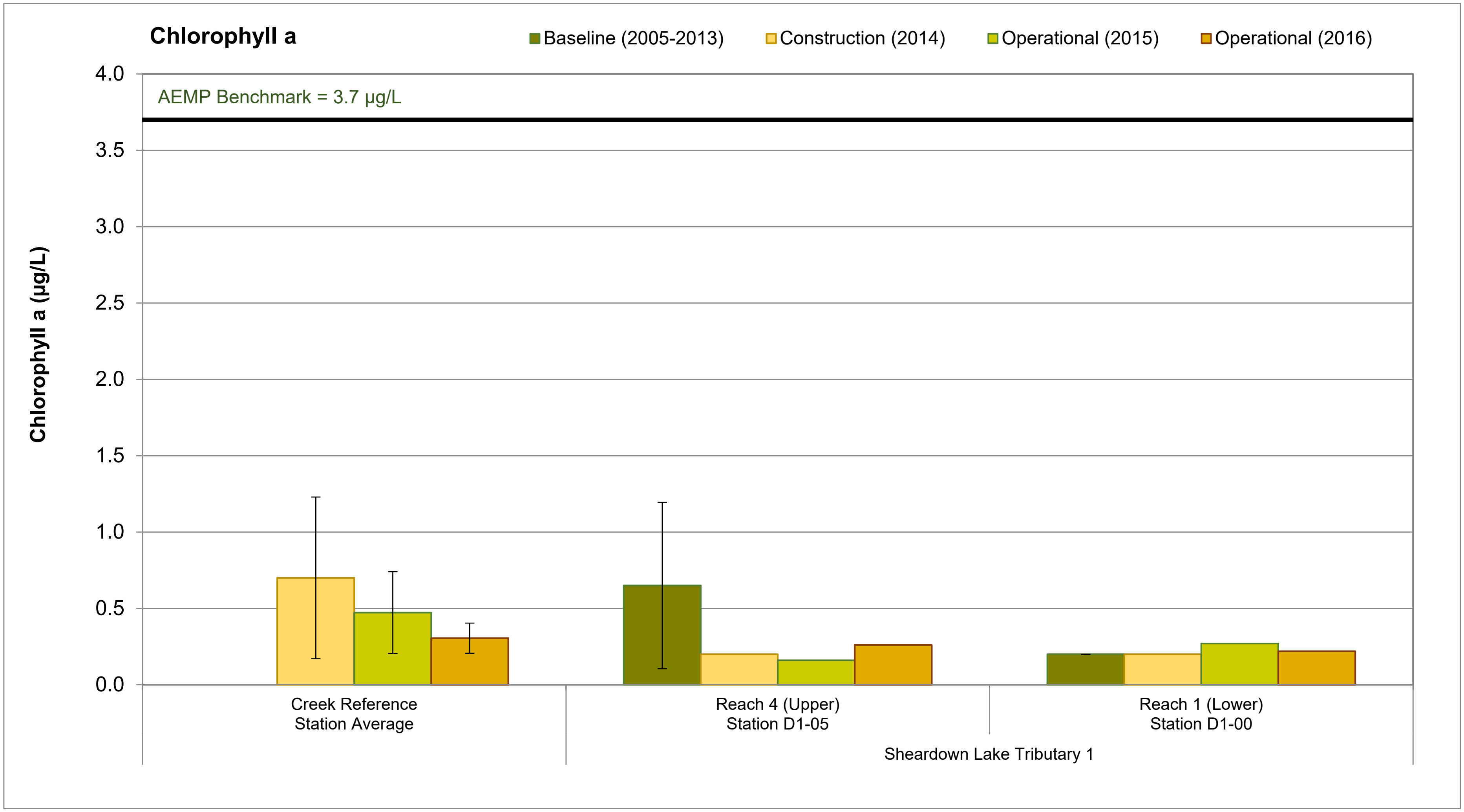

Figure 4.4: Temporal comparison of chlorophyll a concentrations at Sheardown Lake Tributary 1 for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods in the fall, Mary River Project CREMP. The creek reference includes the CLT-REF and MRY-REF series stations (mean ± SD; n = 4).

SDLT1 stations over the mine baseline (2005 – 2013), construction (2014), and operational (2015, 2016) periods (Figure 4.4). These data suggested no adverse mine-related influences to phytoplankton productivity at SDLT1 over the initial two years of mine operation.

4.1.3 Benthic Invertebrate Community

Sheardown Lake Tributary 1 (SDLT1)

The benthic invertebrate community at the lower reach of Sheardown Lake Tributary 1 (SDLT1 R1), near the outlet to Sheardown Lake NW, exhibited significantly lower richness and significant differences in composition (as indicated by Bray-Curtis Index) compared to Unnnamed Reference Creek in 2016 (Figure 4.5; Appendix Table F.25). Although the relative abundances of Hydracarina (water mites) and metal-sensitive chironomids were significantly lower and higher, respectively, at lower SDLT1 than at Unnamed Reference Creek, the magnitude of these differences was within a CES_{BIC} of ± 2 SD_{REF} (Figure 4.5; Appendix Table F.25), suggesting that these differences were not ecologically meaningful. A higher relative abundance of metal-sensitive chironomids at lower SDLT1 also suggested that the differences in community composition compared to Unnamed Reference Creek were unrelated to metal concentrations, which was consistent with concentrations of most metals below WQG at SDLT1 in 2016 (see Appendix Table C.30). A significantly higher relative abundance of FFG filterers (Appendix Table F.25), which were represented predominantly by metal-sensitive chironomids, suggested that higher nitrate (i.e., nutrient) concentrations contributed to higher abundance of phytoplankton (i.e., chlorophyll a) and a consequent shift in benthic food resources at SDLT1 compared to reference conditions. Notably, the occurrence of significantly higher relative abundance of HPG burrowers was consistent with significantly greater substrate embeddedness at SDLT1 than at Unnamed Reference Creek (Appendix Tables F.22 and F.25). Greater substrate embeddedness at SDLT1 may reflect a natural phenomenon, but could also be the result of mine-related sedimentation events in 2016 (Baffinland 2016b). Therefore, the slight shift towards a greater proportion of HPG burrowers in the benthic invertebrate community may have reflected a sedimentation influence at lower SDLT1 in 2016.

Temporal comparison of the lower SDLT1 benthic invertebrate community data indicated significantly higher invertebrate density in 2016 compared to baseline data collected in 2008 and 2013 (Figure 4.6; Appendix Table F.26). However, no significant differences in richness, Simpson's Evenness or any community compositional features occurred consistently between the 2016 data and both respective baseline data sets. Increased benthic invertebrate density can often occur as an outcome of slight nutrient enrichment of aquatic systems (Ward 1992; Taylor and Bailey 1997). However, temporal comparisons indicated similar chlorophyll a concentrations between 2016 and the baseline period at SDLT1 (Figure 4.4), suggesting that

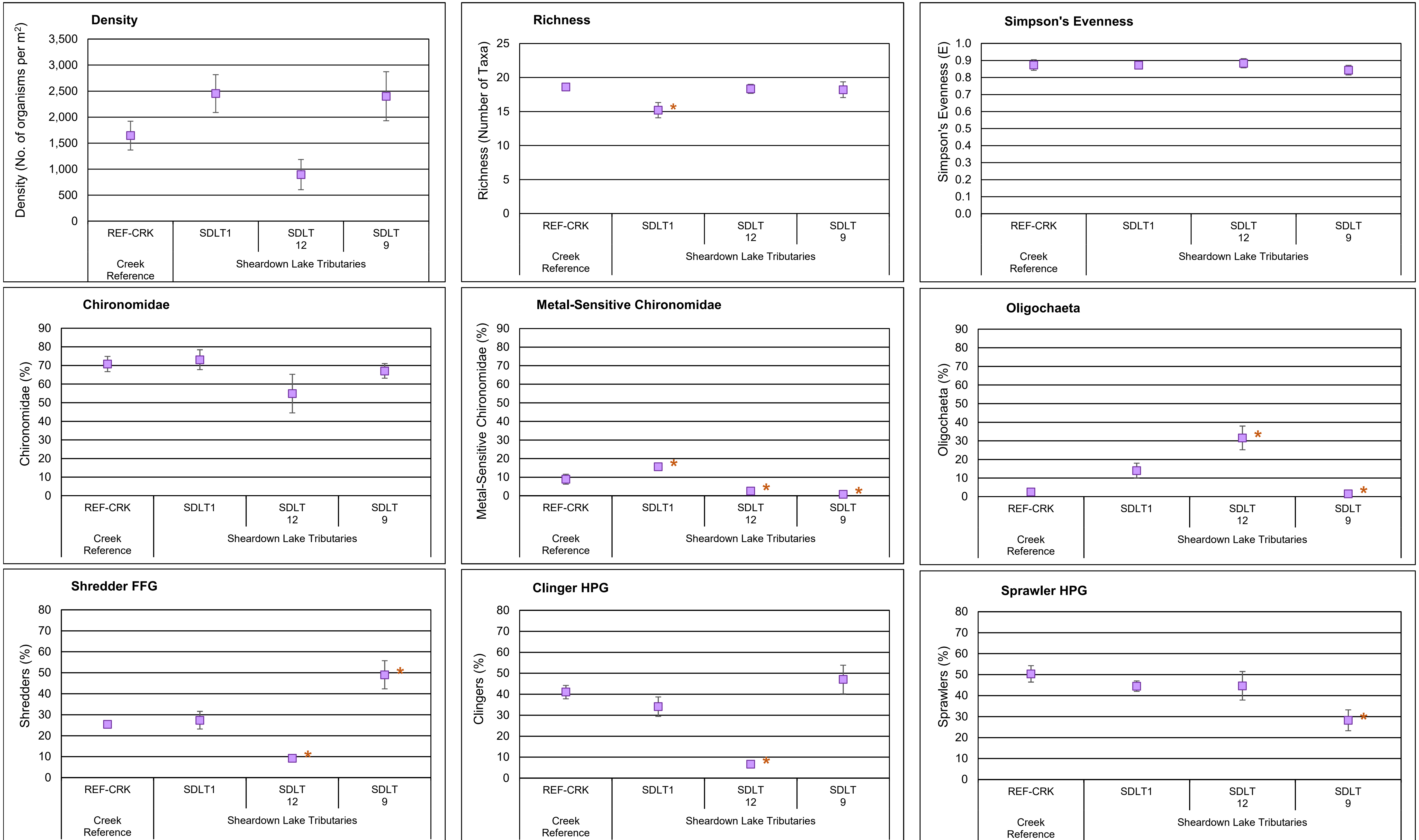

Figure 4.5: Comparison of benthic invertebrate community metrics between Sheardown Lake Tributary and creek reference study areas (mean ± SE), Mary River Project CREMP, August 2016. Asterisk (*) next to SDLT data points indicates significant difference from Unnamed Reference Creek.

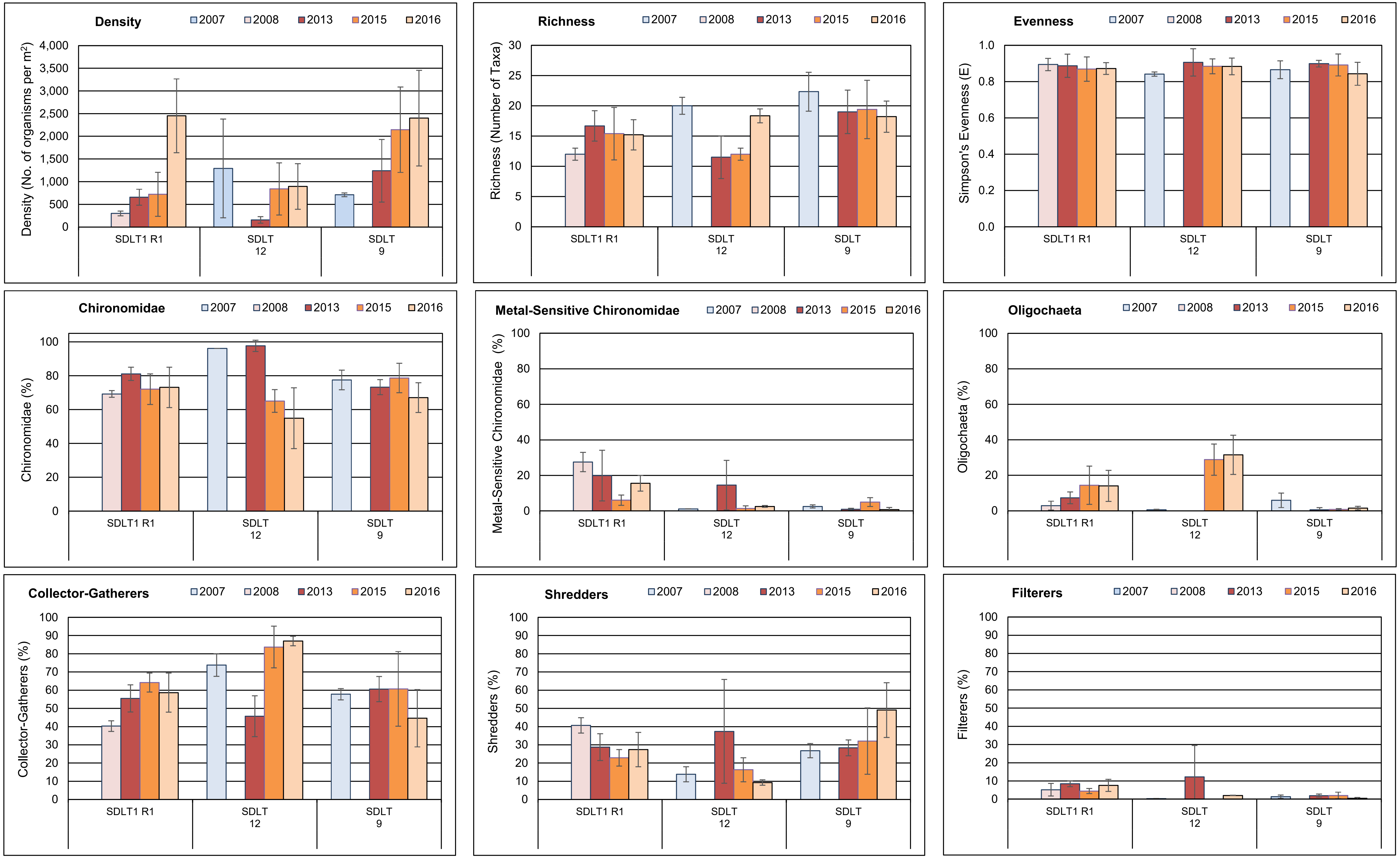

Figure 4.6: Comparison of benthic invertebrate community metrics (mean ± SD) at Sheardown Lake Tributaries 1, 12 and 9 among operational (2015, 2016) and baseline (2007, 2008, 2011, 2013) studies, Mary River Project CREMP.

higher benthic invertebrate density in 2016 was not likely related to a mine-associated change in trophic status of the SDLT1 system. Given the occurrence of few differences in benthic invertebrate community endpoints between 2016 and the baseline period, and the fact that the few differences were not consistently observed in 2015 and 2016 compared to the baseline period, higher density in 2016 potentially reflected natural year-to-year variability within the SDLT1 system. Baseline studies did not include HPG analysis precluding temporal evaluation of benthic endpoints important to assessment of sedimentation influences on in-stream biota.

Sheardown Lake Tributary 12 (SDLT12)

The benthic invertebrate community of Sheardown Lake Tributary 12 (SDLT12) did not differ significantly from Unnamed Reference Creek for primary endpoints of density, richness or Simpson's Evenness in 2016 (Figure 4.5; Appendix Table F.25). However, marked differences in community composition were indicated between these watercourses based on significant differences in Bray-Curtis Index and several key dominant invertebrate, functional feeding and habitat preference groups (Figure 4.5; Appendix Table F.25). Because the magnitude of difference in the relative abundance of metal-sensitive chironomids was within a CES_{BIC} of $\pm$ 2 SD_{REF} (Figure 4.5; Appendix Table F.25), the differences in community composition between SDLT12 and Unnamed Reference Creek were not likely related to metal concentrations. Rather, significantly higher relative abundance of HPG burrowers including Nemata (roundworms) and Oligochaeta (aquatic worms) and FFG collector-gatherer deposit feeders was consistent with the occurrence of significantly slower water velocity and greater substrate embeddedness (i.e., more depositional habitat) at SDLT12 than at Unnamed Reference Creek (Appendix Tables F.22 and F.25). Therefore, a natural difference in habitat features between SDLT12 and Unnamed Reference Creek potentially accounted for differences in benthic invertebrate community compositional features between watercourses. However, similar to SDLT1, a higher relative abundance of HPG burrowers at SDLT12 was also consistent with greater substrate embeddedness that may have resulted from sedimentation events in 2016.

Temporal comparison of the SDLT12 benthic invertebrate community data did not indicate any significant differences in density, richness and Simpson's Evenness between 2016 and baseline data collected in 2007 (Figure 4.6; Appendix Table F.27). However, significantly higher relative abundance of burrowing invertebrates including aquatic worms and Tipulidae (crane flies) together with significantly greater relative abundance of FFG collector-gatherers in both 2015 and 2016 compared to the 2007 baseline study suggested changes in habitat conditions at SDLT12 with the commencement of mine operations. Although such temporal changes potentially reflected slight differences in sampling location between the mine operational and baseline periods, field observations from the 2016 study included the occurrence of silt deposits on in-stream substrate of SDLT12. Therefore, a mine-related reduction in flow and/or increased particle loadings (e.g., through dust and/or erosional deposition) over time may have accounted for subtle temporal changes in the benthic invertebrate community between the 2015/2016 mine operational and 2007 baseline studies. Overall, it was uncertain as to whether changes in benthic invertebrate compositional features over time at SDLT12 reflected natural variability in habitat or a mine-related influence that potentially included greater sedimentation in 2016.

Sheardown Lake Tributary 9 (SDLT9)

The benthic invertebrate community of Sheardown Lake Tributary 9 (SDLT9) did not differ significantly from Unnamed Reference Creek for primary endpoints of density, richness or Simpson's Evenness in 2016 (Figure 4.5; Appendix Table F.25). However, similar to SDLT12, marked differences in community composition were indicated between SDLT9 and Unnamed Reference Creek based on significant differences in Bray-Curtis Index and several groups of dominant taxa, FFG and HPG (Figure 4.5; Appendix Table F.25). Notably, the magnitude of difference in the relative abundance of metal-sensitive chironomids between SDLT9 and the reference creek was within a CES_{BIC} of ± 2 SD_{REF} (Figure 4.5; Appendix Table F.25), suggesting that differences in community composition between watercourses were not likely related to metal concentrations. Rather, a significantly higher relative abundance of HPG burrowers including nemata (roundworms) and Tipulidae (crane flies) combined with a significantly greater relative abundance of FFG shredders was consistent with field observations of greater amounts of rooted in-stream vegetation at SDLT9 compared to the reference creek (Appendix Tables F.1 and F.25). Temporal comparisons indicated no significant differences in benthic invertebrate density, richness, Simpson's Evenness or any dominant invertebrate groups, FFG and HPG at SDLT9 between mine operational period data collected in 2015/2016 and baseline period data collected in 2007 and 2013 (Figure 4.6; Appendix Table F.28). In turn, this suggested that the differences in benthic invertebrate community composition (and amount of in-stream vegetation) between SDLT9 and Unnamed Reference Creek in 2016 likely reflected a natural difference in habitat features between watercourses.

4.2 Sheardown Lake NW (DLO-1)

4.2.1 Water Quality

Water quality profiles of *in-situ* water temperature, dissolved oxygen, pH and specific conductance conducted at Sheardown Lake NW in 2016 showed no substantial station-to-station differences during any of the winter, summer or fall sampling events (Appendix Figures C.10 – C.13). On average, water temperature profiles suggested weak stratification during the summer sampling event, but more strongly established stratification during the fall sampling event at Sheardown Lake NW in 2016 (Figure 4.7). In both seasons, the greatest change in temperature occurred between lake depths of approximately 10 and 15 m, which was comparable to the thermocline depth range observed at Reference Lake 3 (Figure 4.7). Average water temperature at the bottom of the water column at Sheardown Lake NW littoral stations was slightly warmer than at Reference Lake 3 at the time of fall sampling in 2016, the difference of which was statistically significant (Figure 4.8). However, the incremental difference in average bottom water temperature between lakes was small (i.e., 0.6˚C) and thus was unlikely to be ecologically meaningful. Dissolved oxygen profiles at Sheardown Lake NW showed an oxycline at depths greater than approximately 16 m and 10 m during the winter and fall, respectively, but no appreciable change in dissolved oxygen saturation from surface to bottom in the summer of 2016 (Figure 4.7; Appendix Figure C.11). No oxycline was observed at Reference Lake 3 in 2016 during the summer or fall sampling events (Appendix Figure B.3). Dissolved oxygen saturation levels at the bottom of the water column at littoral stations (i.e., approximately 10 m deep) of Sheardown Lake NW were significantly higher than those at Reference Lake 3 during fall 2016 sampling (Figure 4.8; Appendix Table C.37). In addition, dissolved oxygen saturation levels were well above the WQG of 54% at all littoral stations of Sheardown Lake NW in fall 2016 (Figure 4.8) and, with the exception of depths greater than approximately 22 m in winter, through the majority of the water column during winter, summer and fall sampling events (Figure 4.7). This suggested that dissolved oxygen was not limiting for pelagic or bottom-dwelling biota within Sheardown Lake NW for the majority of the year in 2016.

In-situ profiles of pH and specific conductance showed no substantial change from the surface to bottom of the Sheardown Lake NW water column, indicating no chemical stratification (Figure 4.7). Mean pH at the bottom of the water column at littoral stations of Sheardown Lake NW did not differ significantly from that of Reference Lake 3 during fall sampling in 2016 (Figure 4.8; Appendix Table C.37). In addition, pH values were consistently within WQG limits of 6.5 – 9.0 through the entire water column during all 2016 sampling events conducted at Sheardown Lake NW (Appendix Tables C.33 – C.36). Specific conductance was significantly higher at Sheardown Lake NW compared to the reference lake during fall sampling (Figure 4.8; Appendix Table C.37). However, similar to observations at Camp Lake (Section 4.2.1), specific conductance at Sheardown Lake NW was intermediate to that of reference creek and river stations in fall 2016, and therefore it was unclear whether higher specific conductance at Sheardown Lake NW than at Reference Lake 3 was related to natural regional variability in

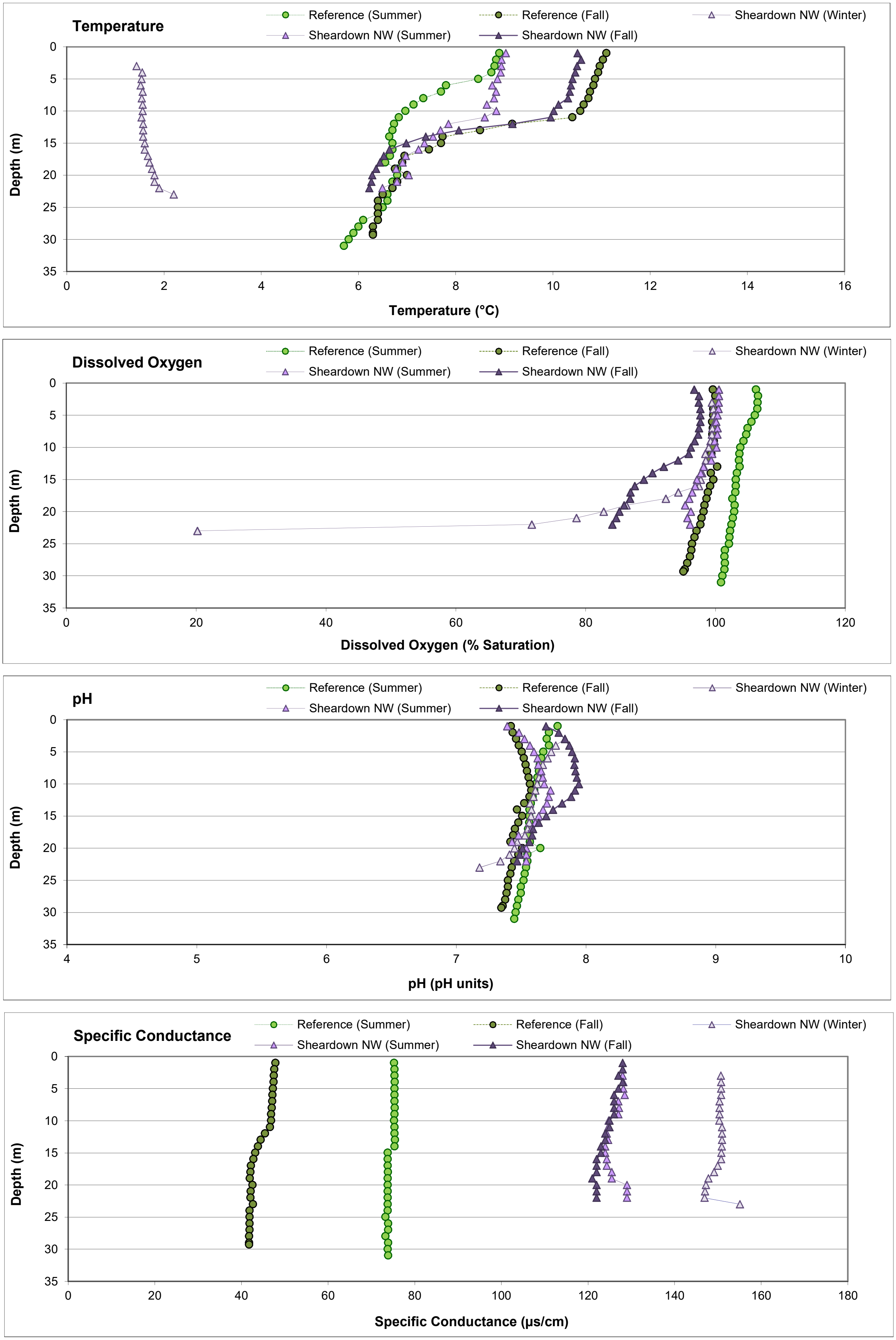

Figure 4.7: Average *in-situ* water quality with depth from surface at Sheardown Lake NW (mine-exposed area) compared to Reference Lake 3 during winter, summer, and fall sampling events, Mary River Project CREMP, 2016.

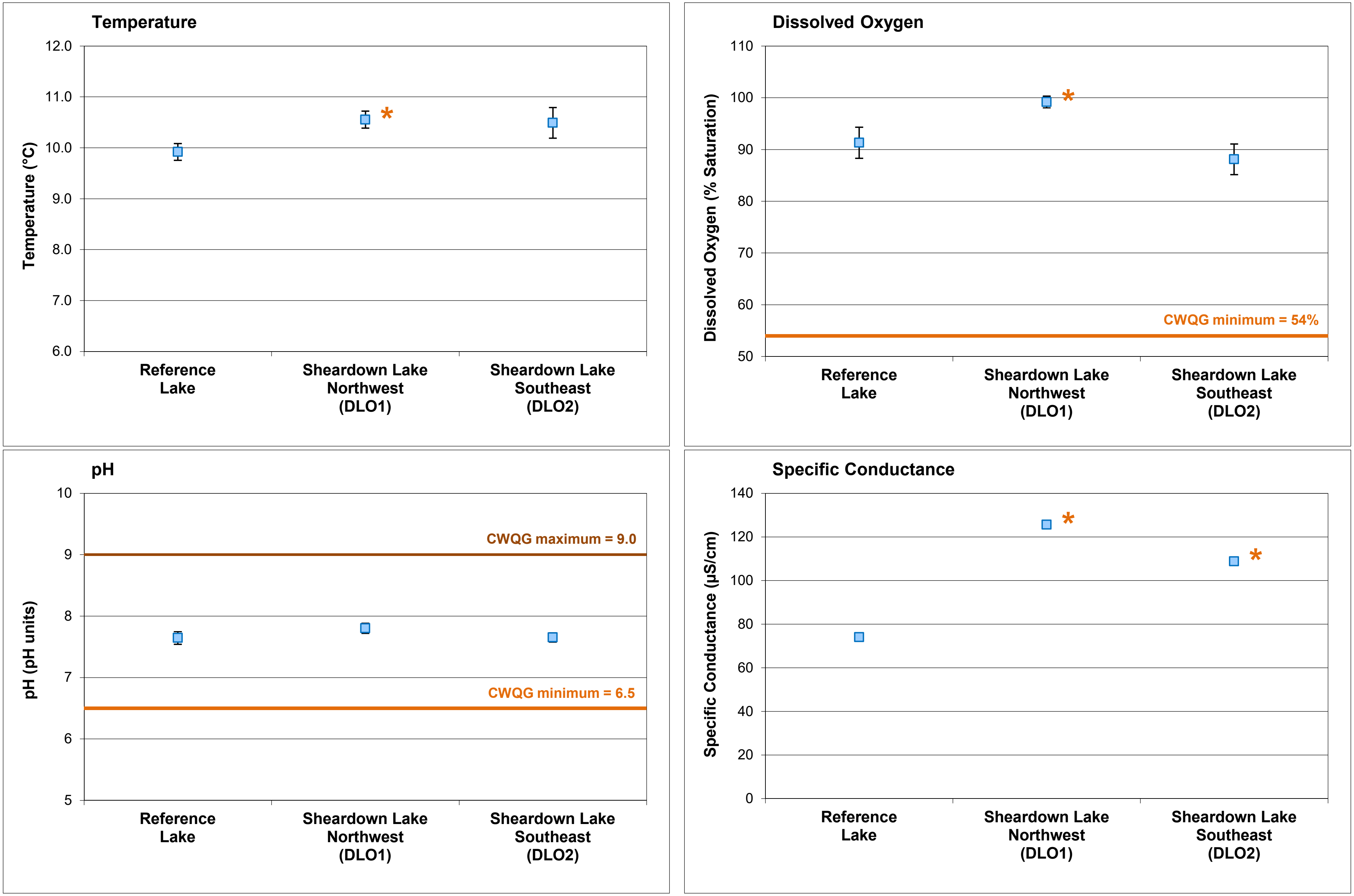

Figure 4.8: Comparison of in-situ water quality (mean ± SD; n = 5) measured near the bottom of the water column at the Sheardown Lake basins and Reference Lake 3 (REF3) littoral benthic invertebrate community stations, Mary River Project CREMP, August 2016. An asterisk (*) next to the Sheardown Lake data point indicates a significant difference compared to the reference lake measure.

surface waters or a mine-related influence. Water clarity, as determined through evaluation of Secchi depth, was significantly lower at Sheardown Lake NW than at Reference Lake 3 during the 2016 fall sampling event (Appendix Tables C.36 – C.37). Secchi depth readings showed relatively low variability among stations at Sheardown Lake NW in the fall of 2016, suggesting no spatial differences in water clarity throughout the lake (Appendix Table C.36).

Water chemistry within Sheardown Lake NW showed no distinct spatial differences in parameter concentrations among the six sampling stations during any of the winter, summer or fall sampling events in 2016 (Table 4.2; Appendix Table C.38), suggesting that the lake waters were continually well mixed both laterally and vertically. Turbidity and total concentrations of aluminum, manganese, molybdenum and uranium were slightly (3- to 5-fold higher) to moderately (5- to 10-fold higher) elevated at Sheardown Lake NW compared to Reference Lake 3 during the summer and/or fall sampling events (Table 4.2; Appendix Table C.38). Similar to the 2015 study, total aluminum and manganese concentrations showed a significant positive correlation with turbidity at Sheardown Lake NW in 2016 ($r = 0.54$ and 0.49, respectively). This suggested that elevated total aluminum and manganese concentrations at Sheardown Lake NW reflected influences associated with surface runoff or backflow received from Mary River that contained naturally high concentrations of aluminum-based, manganese bearing, particulate minerals. This was supported through comparisons of dissolved metal concentrations, which indicated that only dissolved molybdenum and uranium concentrations (and not aluminum or manganese) were elevated at Sheardown Lake NW compared to Reference Lake 3 (Appendix Table C.39). In addition, the ratio of dissolved to total concentrations of aluminum and manganese indicated that the majority (i.e., >65%) of each of these metals was in the dissolved fraction at Sheardown Lake NW based on the 2016 data. Although total molybdenum and uranium concentrations were not correlated with turbidity, similar concentrations of these metals were observed between Sheardown lake NW and the reference creek and river stations during summer and fall 2016 monitoring. In turn, this suggested that higher molybdenum and uranium concentrations at Sheardown Lake NW compared to Reference Lake 3 may have also reflected natural geochemical differences between these lakes. Despite elevation of total aluminum, manganese, molybdenum and uranium metals at Sheardown Lake NW compared to Reference Lake 3, concentrations of all parameters were well below established WQG and AEMP benchmarks at Sheardown Lake NW during all sampling events in 2016[8] (Table 4.2; Appendix Table C.38).

[8] Refer to footnote 2 (page 23) and Appendix B regarding phenol concentrations above WQG at the mine-exposed and reference areas of the Mary River Project LSA waterbodies.

Table 4.2: Water chemistry at Sheardown Lake NW (DLO-01) and Reference Lake 3 (REF3) monitoring stations, Mary River Project CREMP, August 2016. Values presented are averages of samples taken from the surface and the bottom of the water column at each station. * Copper data confounded by sampling equipment.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Reference Lake 3 Average (n = 3)	Sheardown Lake NW Station					
						DD-HAB9 STN1	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
					Fall 2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	22-Aug-2016	22-Aug-2016	22-Aug-2016
Conventionals[b]	Conductivity (lab)	umho/cm	-	-	84	134	130	130	133	129	133
	pH (lab)	pH	6.5 - 9.0	-	7.68	8.14	7.89	7.98	8.12	7.93	8.12
	Hardness (as $CaCO_3$)	mg/L	-	-	35	64	63	63	63	62	62
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	39	65	62	67	67	59	63
	Turbidity	NTU	-	-	0.33	0.91	0.81	0.82	0.84	0.88	0.79
	Alkalinity (as $CaCO_3$)	mg/L	-	-	33	61	61	59	60	59	59
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	0.040	0.027	0.026	0.040	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	<0.020	0.028	0.023	0.022	0.027	0.025	0.023
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.7	1.6	1.8	1.9	1.8	1.7	1.7
	Total Organic Carbon	mg/L	-	-	2.8	2.0	1.9	2.0	1.9	1.8	1.8
	Total Phosphorus	mg/L	0.020[α]	-	0.010	0.005	0.015	0.007	0.004	0.006	0.010
	Phenols	mg/L	0.004[α]	-	0.003	0.002	0.016	0.009	0.004	0.002	0.004
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.3	3.0	3.0	3.0	3.1	3.0	3.1
	Sulphate (SO_4)	mg/L	218[β]	218	4.1	4.3	3.6	3.8	4.2	3.8	4.1
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.004	0.013	0.011	0.013	0.017	0.011	0.017
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00653	0.00618	0.00607	0.00615	0.00617	0.00601	0.00643
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	7.0	12.2	12.3	12.7	12.6	12.2	12.8
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.0008	0.0010	0.0009	0.0009	*	*	*
	Iron (Fe)	mg/L	0.30	0.300	<0.030	0.03	0.03	0.03	0.03	0.03	0.03
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
	Lithium (Li)	mg/L	-	-	<0.0010	0.001	0.001	0.001	0.0012	0.0011	0.0013
	Magnesium (Mg)	mg/L	-	-	4.3	7.9	7.5	7.6	7.8	7.6	7.9
	Manganese (Mn)	mg/L	0.935[β]	-	0.00062	0.00201	0.00240	0.00207	0.00201	0.00214	0.00217
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.00014	0.00075	0.00076	0.00077	0.00076	0.00072	0.00077
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00065	0.00061	0.00064	0.00061	0.00063	0.00065
	Potassium (K)	mg/L	-	-	0.89	1.09	1.07	1.06	1.08	1.06	1.10
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.42	0.46	0.51	0.48	0.48	0.51	0.48
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.84	1.40	1.35	1.33	1.40	1.35	1.39
	Strontium (Sr)	mg/L	-	-	0.0081	0.0082	0.0083	0.0085	0.0084	0.0081	0.0084
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00027	0.00103	0.00094	0.00094	0.00102	0.00094	0.00098
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake NW.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

(grey box) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Temporal comparisons of the Sheardown Lake NW water chemistry data suggested that average (total) concentrations of the majority of parameters in 2016 were within the range of baseline concentrations (2005 – 2013; Figure 4.9; Appendix Figure C.18). Only phenol concentrations showed moderate elevation (i.e., 5- to 10-fold higher) in 2016 compared to the baseline data based on fall sampling results (Appendix Table C.40). A number of parameters, including conductivity, molybdenum, sodium and strontium, showed successively higher concentrations over years of mine-construction (2014), initial mine operation (2015) and 2016 (Figure 4.9; Appendix Figure C.18; Appendix Table C.40). Although the magnitude of these changes were relatively minor and, because concentrations in 2016 remained well below WQG, were unlikely to be ecologically meaningful, the sequential increases were consistent with greater mine-related influence on water quality over time at Sheardown Lake NW.

4.2.2 Sediment Quality

Surficial sediment collected at the Sheardown Lake NW coring stations was characterized by silt to sandy loam material with low TOC content (Figure 4.10). Although littoral station co-dominant sand and silt sediment particle sizes did not differ significantly between Sheardown Lake NW and the reference lake, sediment TOC content was significantly lower at Sheardown Lake NW (Appendix Table D.14). Similar to observations at Reference Lake 3 and Camp Lake, reddish- to orange-brown oxidized material was commonly observed on the surface of Sheardown Lake NW littoral and profundal sediments (Appendix Tables D.11 – D.13). In Sheardown Lake NW, this material occasionally occurred as a thin, distinct layer that was likely composed principally of iron (oxy)hydroxide precipitate. No visible evidence of excessive sedimentation was observed at Sheardown Lake NW in 2016 (Appendix Tables D.11 – D.13). Below the surficial layer, substrates at some Sheardown Lake NW littoral and profundal stations exhibited blackening and/or darkening and possessed a slight sulphidic odour suggesting the occurrence of reducing conditions and, in some cases, a distinct redox boundary was observed in sediments of the lake (Appendix Tables D.11 to D.13). The occurrence of reducing sediment conditions in 2016 appeared to be more pronounced at Sheardown Lake NW than at the reference lake, where reducing sediment conditions occurred sporadically within the sediment (Appendix Tables D.1 – D.3 and D.11 – D.13).

Sediment metal concentrations at Sheardown Lake NW showed no spatial differences among stations in 2016 with the possible exception of at the littoral station located nearest the SDLT1 lake inlet (i.e., Station DD-HAB9-Stn2; Appendix Table D.15). At this station, sediment barium, iron, manganese, molybdenum and phosphorus concentrations were noticeably higher than at other littoral stations, and compared to profundal stations, suggesting that these metals originated from the SDLT1 watercourse. Erosion events that resulted in elevated total

Figure 4.9: Temporal comparison of water chemistry at Sheardown Lake Northwest (DLO-01) and Sheardown Lake Southeast (DLO-02) for mine baseline (2005 - 2013), construction (2014), and operational (2015, 2016) periods during fall. Values represent mean ± SD. Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.3 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to Sheardown Lake (northwest and southeast).

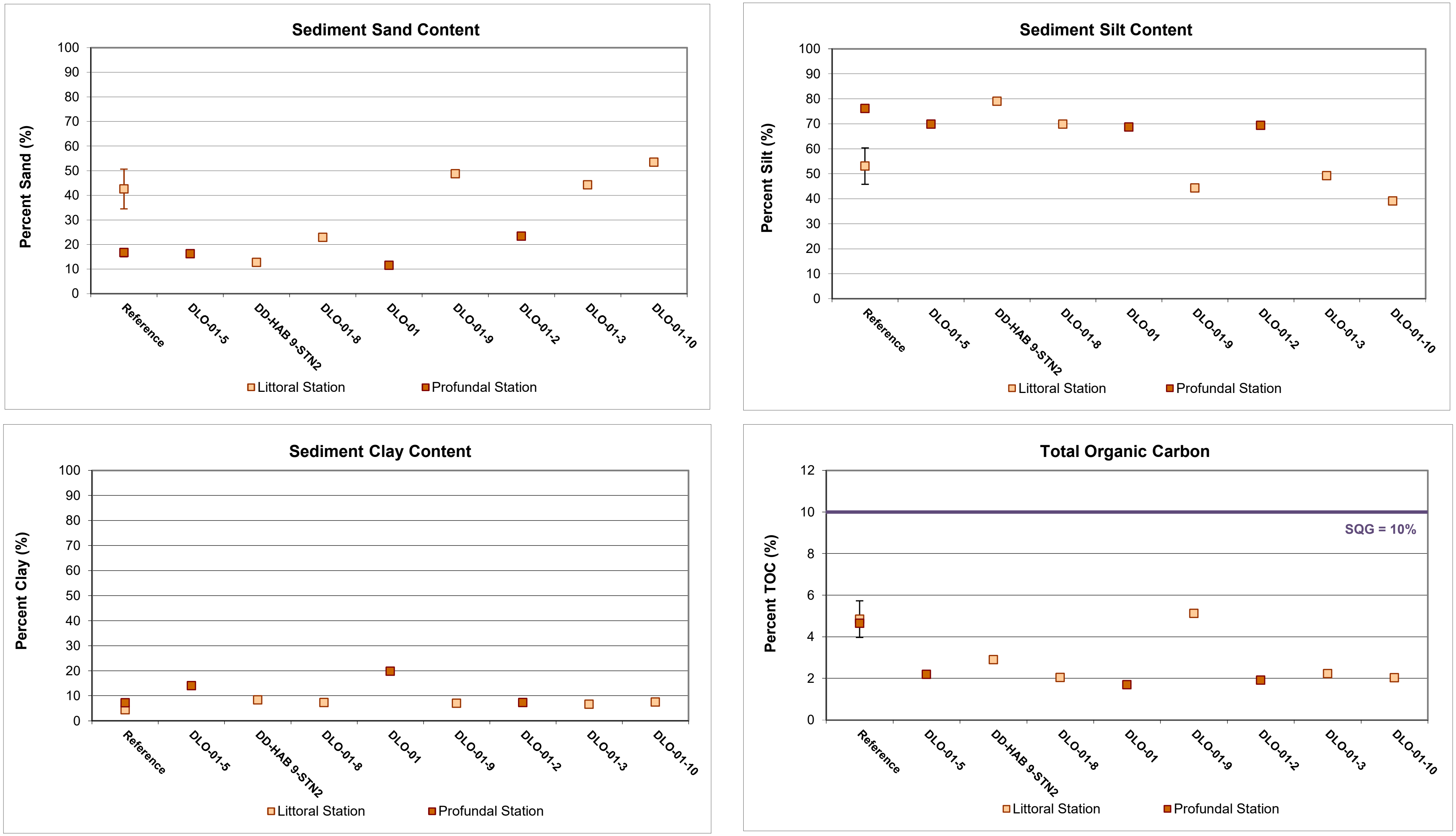

Figure 4.10: Sediment particle size and total organic carbon (TOC) content comparisons among Sheardown Lake NW (DLO-01) sediment monitoring stations and Reference Lake 3 averages (mean ± SE), Mary River Project CREMP, August 2016.

suspended solids (TSS) concentrations at SDLT1 during spring freshet potentially contributed to higher concentrations of these metals in lake sediments near the watercourse outlet to Sheardown Lake NW in 2016 (see Baffinland 2016). On average, concentrations of arsenic, manganese and molybdendum were slightly elevated (i.e., 2- to 5-fold higher) in sediment at littoral stations of Sheardown Lake NW compared to the reference lake littoral stations (Table 4.3). However, average metal concentrations in sediment at profundal stations were similar between lakes (Table 4.3). Although mean iron and manganese concentrations were above applicable SQG at littoral and profundal stations of Sheardown Lake NW, mean concentrations of these metals were also above SQG at profundal stations of Reference Lake 3 (Table 4.3). Similarly, despite mean arsenic and iron concentrations above respective AEMP benchmarks in sediment at profundal stations of Sheardown Lake NW, mean concentrations of these metals, together with chromium and copper, were above applicable AEMP benchmarks in sediment at profundal stations of Reference Lake 3 (Table 4.3). This suggested that, in part, elevated arsenic, iron, manganese concentrations at Sheardown Lake NW compared to sediment quality guidelines/benchmarks reflected at natural phenomenon. Lastly, sediment nickel and phosphorus concentrations were above SQG and the AEMP benchmark at individual stations in Sheardown Lake NW, but on average, were below the applicable guidelines/benchmarks (Table 4.3; Appendix Table D.15).

Temporal comparisons of the sediment metals data indicated slightly elevated (i.e., 2- to 5-fold higher) average concentrations of arsenic, barium, iron, manganese and molybdenum at littoral stations of Sheardown Lake NW in 2016 compared to the baseline (2005 – 2013) period[9] (Figure 4.11). No substantial changes in metal concentrations occurred at profundal stations between 2016 and the baseline period (Figure 4.11; Appendix Table D.16). The parameters listed above showed progressively higher mean concentrations from baseline, to mine construction, to 2015 and 2016 mine operational years in sediment at littoral stations of Sheardown Lake NW. However, variability in parameter concentrations was high, and none of the above listed parameters exhibited concentrations greater than at the reference lake littoral and profundal stations (Figure 4.11; Appendix Table D.16). Similar to the analysis of Camp Lake sediment quality data, this suggested that changes in station replication and location among studies likely contributed to the appearance of greater mean concentrations of select parameters in sediment over time at the Sheardown Lake NW littoral stations. Nevertheless, because arsenic, barium, iron, manganese and molybdenum have shown progressively higher mean concentrations in littoral and/or profundal sediment of both

[9] Refer to footnote 6 (page 32) regarding temporal differences in sediment boron concentrations at Mary River Project LSA waterbodies.

Table 4.3: Sediment particle size, total organic carbon, and metal concentrations at Sheardown Lake NW (DLO-01), Sheardown Lake SE (DLO-02) and Reference Lake 3 (REF3) sediment monitoring stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b] (NW ; SE)	Littoral			Profundal	
					Reference Lake (n = 5)	Sheardown Lake NW (n=5)	Sheardown Lake SE (n=5)	Reference Lake (n = 5)	Sheardown Lake NW (n=3)
					Average ± Std. Error	Average ± Std. Error	Average ± Std. Error	Average ± Std. Error	Average ± Std. Error
Non-metals	Sand	%	-	-	42.5 ± 8.1	36.4 ± 7.9	12.0 ± 2.5	16.7 ± 1.5	17.0 ± 3.5
	Silt	%	-	-	53.1 ± 7.3	56.3 ± 7.7	73.0 ± 1.8	76.1 ± 1.4	69.3 ± 0.3
	Clay	%	-	-	4.4 ± 1.0	7.3 ± 0.3	14.9 ± 1.8	7.2 ± 0.4	13.7 ± 3.6
	Moisture	%	-	-	89.7 ± 6.0	70.4 ± 5.0	41.4 ± 3.3	83.5 ± 5.4	58.4 ± 2.7
	Total Organic Carbon	%	10[α]	-	4.85 ± 0.88	2.86 ± 0.59	1.30 ± 0.19	4.64 ± 0.13	1.94 ± 0.14
Metals	Aluminum (Al)	mg/kg	-	-	16,480 ± 397	15,620 ± 1,329	16,440 ± 1,127	25,150 ± 1,418	21,217 ± 1,516
	Antimony (Sb)	mg/kg	-	-	<0.10 ± 0	<0.10 ± 0	<0.10 ± 0	0.12 ± 0.02	<0.10 ± 0
	Arsenic (As)	mg/kg	17	6.2 ; 5.9	3.71 ± 0.26	***7.95 ± 1.88***	4.40 ± 0.69	***6.47 ± 0.27***	4.30 ± 0.35
	Barium (Ba)	mg/kg	-	-	112 ± 11	196 ± 107	92 ± 17	162 ± 8	101 ± 5
	Beryllium (Be)	mg/kg	-	-	0.67 ± 0.02	0.82 ± 0.07	0.76 ± 0.05	1.02 ± 0.05	1.11 ± 0.09
	Bismuth (Bi)	mg/kg	-	-	<0.20 ± 0.0	0.23 ± 0.02	0.29 ± 0.10	0.21 ± 0.004	0.27 ± 0.03
	Boron (B)	mg/kg	-	-	13.0 ± 0.9	24.0 ± 2.6	21.5 ± 1.7	19.2 ± 1.0	30.7 ± 2.0
	Cadmium (Cd)	mg/kg	3.5	1.5	0.146 ± 0.035	0.267 ± 0.059	0.103 ± 0.008	0.180 ± 0.010	0.257 ± 0.009
	Calcium (Ca)	mg/kg	-	-	5,128 ± 470	4,494 ± 429	5,112 ± 627	6,111 ± 156	4,402 ± 146
	Chromium (Cr)	mg/kg	90	97 ; 79	55.0 ± 1.2	61.9 ± 4.6	70.7 ± 3.7	***80.0 ± 4.1***	78.1 ± 3.9
	Cobalt (Co)	mg/kg	-	-	10.15 ± 0.57	12.70 ± 0.83	13.08 ± 0.77	18.15 ± 0.75	15.83 ± 0.70
	Copper (Cu)	mg/kg	110	58 ; 56	***66.5 ± 7.4***	42.9 ± 7.2	25.8 ± 1.5	***101.4 ± 5.6***	46.7 ± 3.3
	Iron (Fe)	mg/kg	40,000[α]	52,200 ; 34,400	29,840 ± 3,488	***58,740 ± 9,478***	***40,340 ± 3,922***	***53,580 ± 2,174***	40,333 ± 2,067
	Lead (Pb)	mg/kg	91.3	35	***46.0 ± 17.4***	19.8 ± 1.6	21.7 ± 4.3	29.5 ± 5.0	31.0 ± 3.6
	Lithium (Li)	mg/kg	-	-	27.3 ± 0.4	27.5 ± 2.4	30.4 ± 2.3	41.7 ± 2.1	39.1 ± 2.5
	Magnesium (Mg)	mg/kg	-	-	10,852 ± 274	10,896 ± 780	12,720 ± 357	16,160 ± 814	13,517 ± 738
	Manganese (Mn)	mg/kg	1,100[α,β]	4,530 ; 657	496 ± 99	2,503 ± 1,952	***1,596 ± 911***	***1,866 ± 449***	1,435 ± 720
	Mercury (Hg)	mg/kg	0.486	0.17	0.0355 ± 0.0063	0.0385 ± 0.0057	0.0252 ± 0.0028	0.0699 ± 0.0019	0.0432 ± 0.0078
	Molybdenum (Mo)	mg/kg	-	-	2.19 ± 0.49	8.80 ± 2.94	1.65 ± 0.45	3.27 ± 0.34	2.99 ± 1.39
	Nickel (Ni)	mg/kg	75[α,β]	77 ; 66	38.6 ± 1.6	65.8 ± 6.5	55.8 ± 3.2	56.3 ± 2.6	67.8 ± 0.9
	Phosphorus (P)	mg/kg	2,000[α]	1,958 ; 1,278	840 ± 47	1,410 ± 292	1,026 ± 56	1,121 ± 57	891 ± 29
	Potassium (K)	mg/kg	-	-	3,894 ± 172	3,806 ± 311	3,908 ± 319	5,891 ± 281	5,255 ± 328
	Selenium (Se)	mg/kg	-	-	0.49 ± 0.06	0.42 ± 0.07	0.20 ± 0	0.85 ± 0.06	0.40 ± 0.05
	Silver (Ag)	mg/kg	-	-	0.12 ± 0.01	0.12 ± 0.01	0.11 ± 0.01	0.27 ± 0.01	0.18 ± 0.03
	Sodium (Na)	mg/kg	-	-	296 ± 29	231 ± 20	267 ± 22	455 ± 24	301 ± 15
	Strontium (Sr)	mg/kg	-	-	11.4 ± 0.5	10.0 ± 0.5	10.5 ± 0.4	15.8 ± 0.6	12.2 ± 0.6
	Thallium (Tl)	mg/kg	-	-	0.388 ± 0.021	0.448 ± 0.045	0.377 ± 0.027	0.801 ± 0.035	0.583 ± 0.026
	Tin (Sn)	mg/kg	-	-	56.3 ± 28.9	4.6 ± 1.3	10.6 ± 6.3	16.3 ± 7.8	13.1 ± 7.0
	Titanium (Ti)	mg/kg	-	-	1,072 ± 36	968 ± 67	1,188 ± 42	1,331 ± 69	1,257 ± 62
	Uranium (U)	mg/kg	-	-	11.9 ± 1.5	8.16 ± 1.8	5.17 ± 0.5	27.3 ± 1.5	8.29 ± 1.0
	Vanadium (V)	mg/kg	-	-	50.0 ± 1.3	46.5 ± 3.9	47.6 ± 2.5	72.0 ± 3.6	59.6 ± 3.2
	Zinc (Zn)	mg/kg	315	135	73.7 ± 2.7	56.6 ± 4.7	51.5 ± 2.7	105 ± 5.1	73.0 ± 4.1
	Zirconium (Zr)	mg/kg	-	-	4.3 ± 0.6	9.7 ± 2.8	15.2 ± 1.5	4.0 ± 0.2	9.4 ± 2.9

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2015)).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, baseline sediment quality data, and method detection limits. The indicated values are specific to each respective Sheardown Lake basins.

[shaded] Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

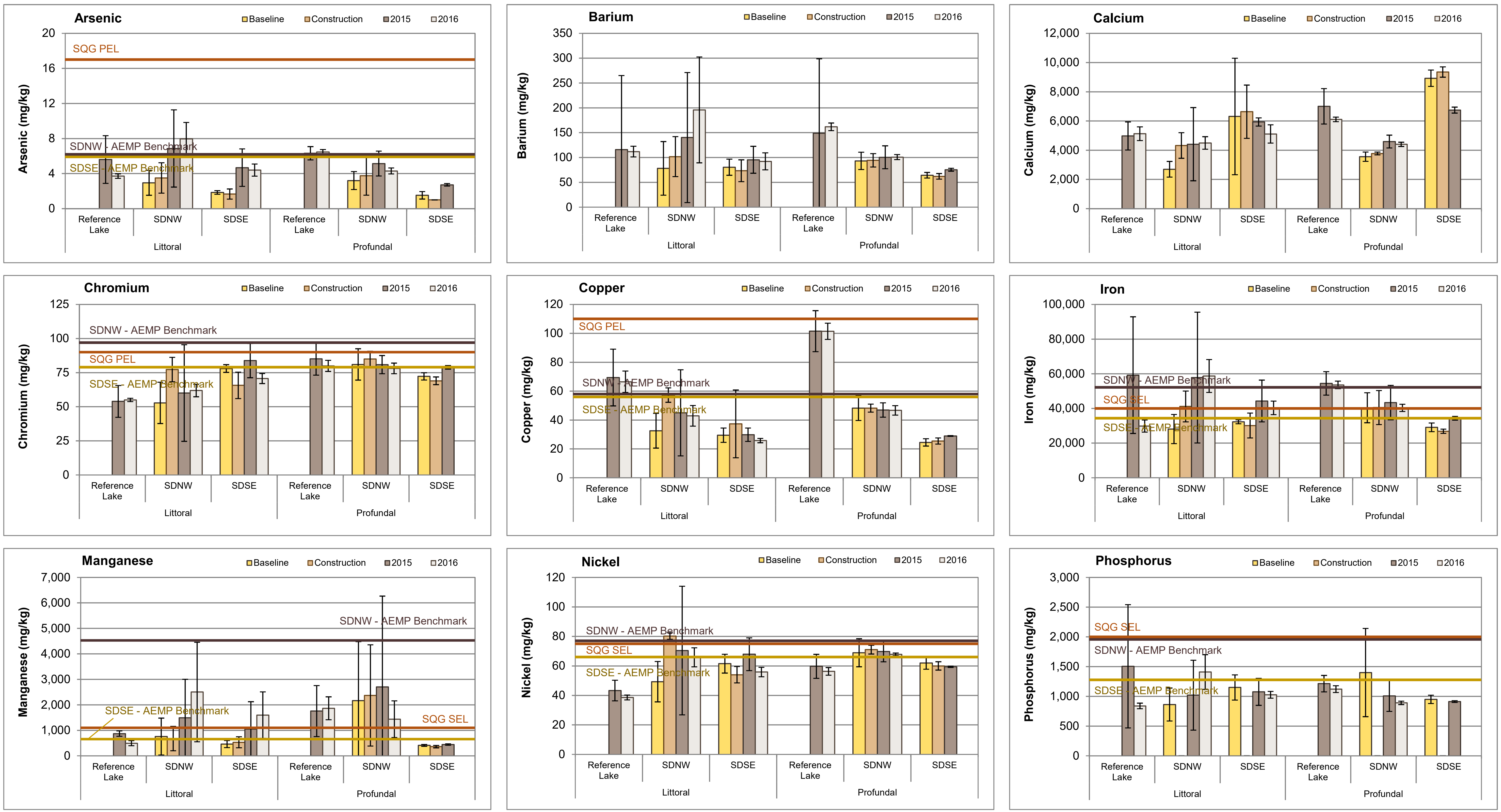

Figure 4.11: Temporal comparison of sediment metal concentrations (mean ± SD) at littoral and profundal stations of Sheardown Lake NW (SDNW), Sheardown Lake SE (SDSE), and Reference Lake 3 for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during fall, Mary River Project CREMP, 2016.

Sheardown Lake NW and Camp Lake, these parameters also reflect a potential mine-related influence on sediment quality at these mine-exposed lakes.

4.2.3 Phytoplankton

Chlorophyll a concentrations at Sheardown Lake NW showed no distinct spatial gradients among stations during the winter and fall sampling events, but higher concentrations were apparent with closer proximity to the lake outlet during the summer sampling event in 2016 (Figure 4.12). Chlorophyll a concentrations differed significantly among seasons at Sheardown Lake NW in 2016, with highest and lowest concentrations observed in summer and winter, respectively (Appendix Table E.9), reflecting similar seasonal differences in chlorophyll a concentrations at the reference lake (Appendix Table B.8). Although chlorophyll a concentrations were significantly higher at Sheardown Lake NW compared to Reference Lake 3 for both the summer and fall sampling events in 2016 (Appendix Tables E.5 – E.6), chlorophyll a concentrations during each of the winter, summer and fall sampling events were well below the AEMP benchmark of 3.7 µg/L (Figure 4.12). Chlorophyll a concentrations at Sheardown Lake NW were suggestive of an 'oligotrophic' status using Wetzel (2001) lake trophic status classifications. This trophic status classification was consistent with a CWQG oligotrophic categorization of Sheardown Lake NW based on mean aqueous total phosphorus concentrations below 10 µg/L during all sampling events (Table 4.2; Appendix Table C.38).

Temporally, the 2016 Sheardown Lake NW chlorophyll a concentrations did not differ significantly from concentrations during the mine construction (2014) and 2015 early-operational periods in any consistent direction among the winter, summer or fall seasons (Figure 4.13). In addition, annual average chlorophyll a concentrations did not differ significantly among 2014, 2015 and 2016 (Appendix Table E.9), suggesting no ecologically meaningful changes in the trophic status of Sheardown Lake NW since the onset of mine operations at the Mary River Project. No chlorophyll a data are available for the baseline (2005 – 2013) period for Sheardown Lake NW, precluding comparisons of chlorophyll a data to the period prior to mine construction.

4.2.4 Benthic Invertebrate Community

The benthic invertebrate community at Sheardown Lake NW littoral stations exhibited significantly higher richness, but no significant differences in density or Simpson's Evenness, compared to Reference Lake 3 littoral stations in 2016 (Table 4.4). The occurrence of a higher taxonomic richness at Sheardown Lake NW was not consistent with effects that would be expected as a result of exposure to elevated metal concentrations. Moderate Simpson's Evenness at Sheardown Lake NW indicated that the distribution of benthic invertebrates in the

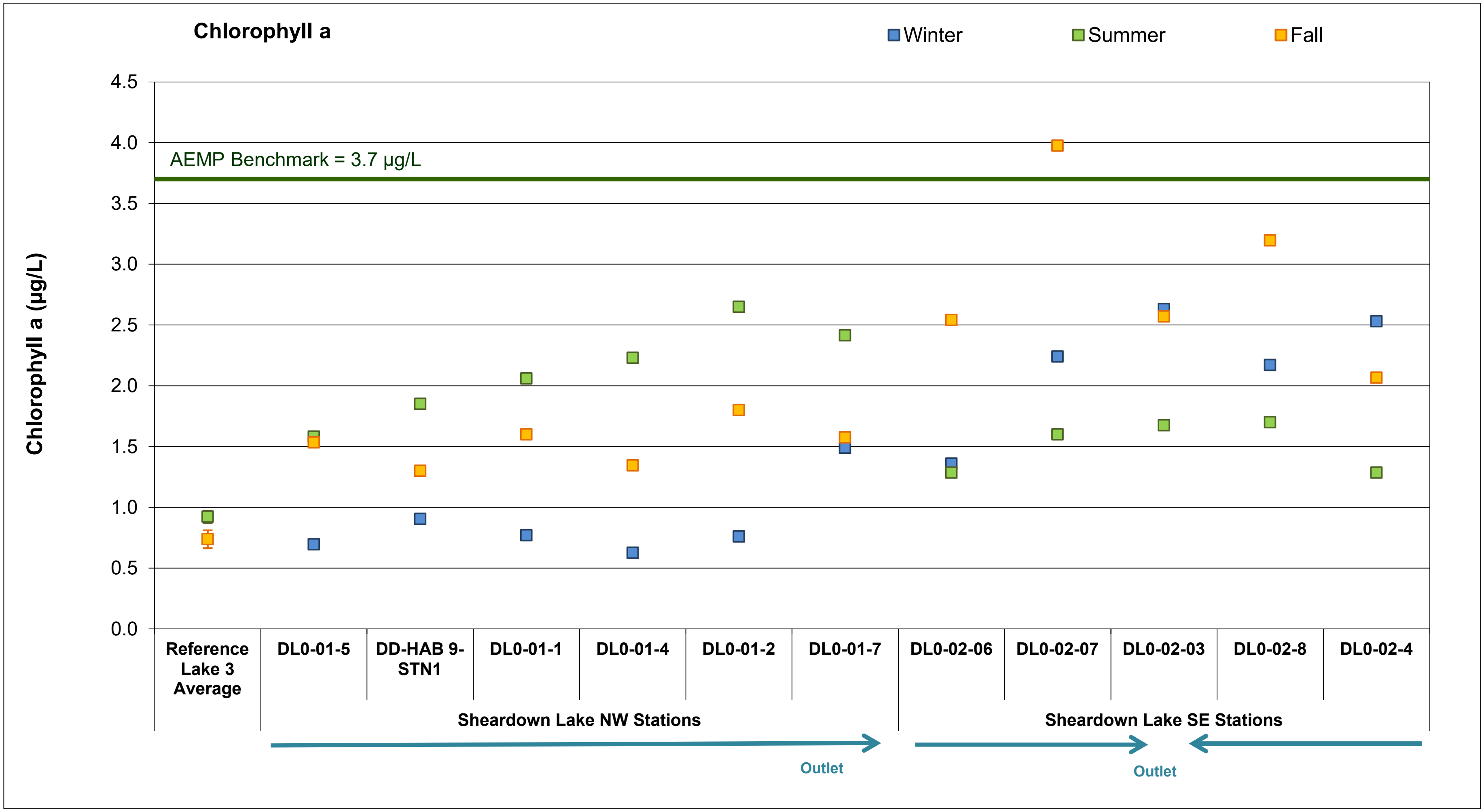

Figure 4.12: Chlorophyll a concentrations at Sheardown Lake NW (DLO-1) and Sheardown Lake SE (DLO-2) phytoplankton monitoring stations, Mary River Project CREMP, 2016. Values are averages of samples taken from the surface and the bottom of the water column at each station. Reference values are expressed as mean ± standard deviation (n = 3). Reference Lake 3 was not sampled in winter 2016.

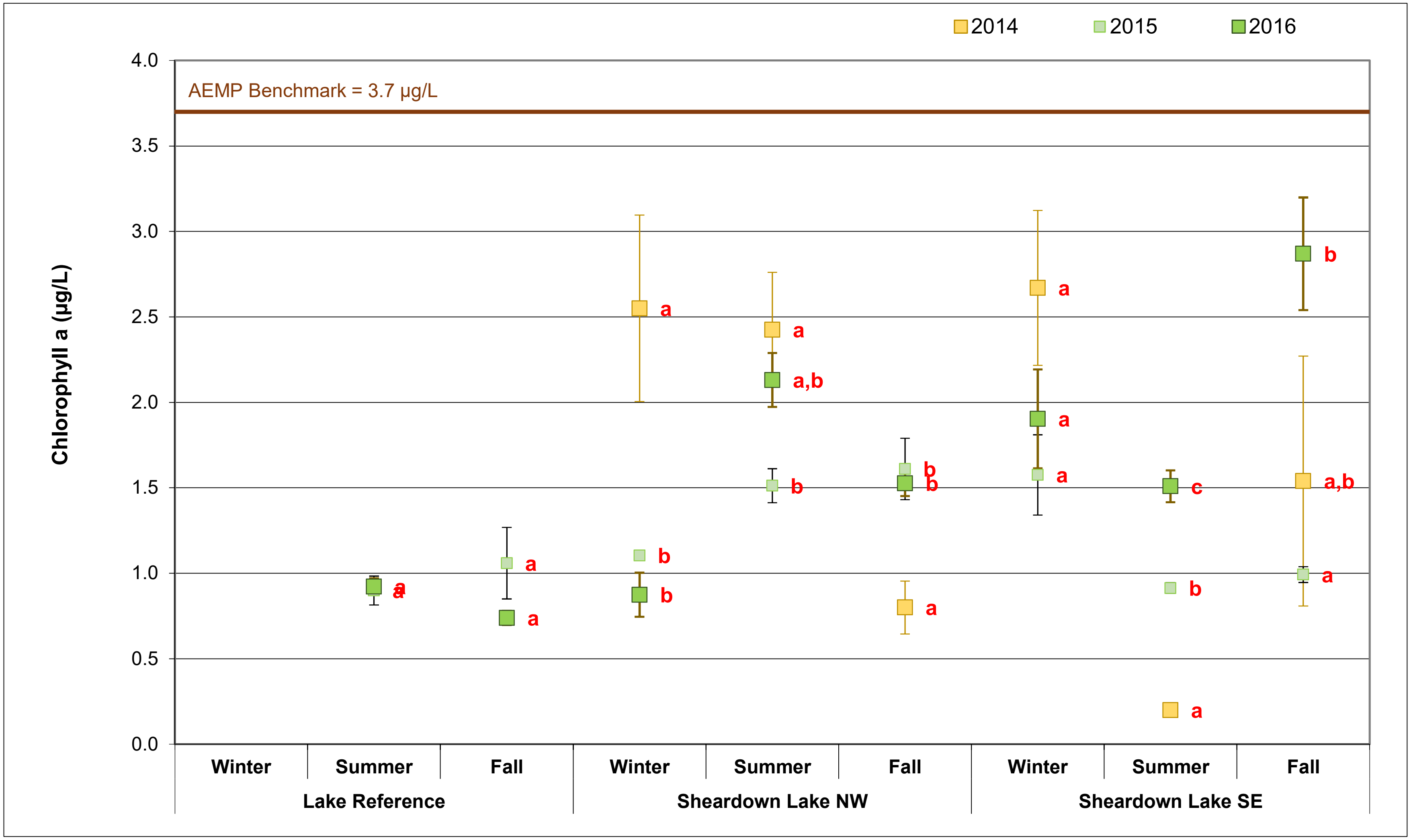

Figure 4.13: Chlorophyll a concentration seasonal comparison among 2014, 2015 and 2016 years (mean ± SE) at Sheardown Lake phytoplankton monitoring stations, Mary River Project CREMP. Data points with the same letter on the right do not differ significantly between years for the applicable season.

Table 4.4: Benthic invertebrate community statistical comparison results between the Sheardown Lake Nowrthwest basin (DLO1) and Reference Lake 3 littoral stations, Mary River Project CREMP, August 2016.

Metric	Statistical Test Results					Summary Statistics					
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Power	Magnitude of Difference[b] (No. of SD)	Area	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Maximum
Density (Individuals/m^2)	No	0.236	ι, δ, γ	-	-	Reference Lake 3	2,390	1,396	624	897	4,240
						SDNW Lake Littoral	5,503	4,184	1,871	1,415	10,484
Richness (Number of Taxa)	Yes	0.077	α, δ, γ	0.583	2.2	Reference Lake 3	12.2	1.1	0.5	11.0	14.0
						SDNW Lake Littoral	14.6	2.4	1.1	12.0	18.0
Simpson's (E) Krebs	No	0.008	γ	-	-	Reference Lake 3	0.758	0.189	0.084	0.420	0.849
						SDNW Lake Littoral	0.893	0.024	0.011	0.860	0.918
Bray-Curtis Index	Yes	0.002	α, ε, γ	1.000	2.8	Reference Lake 3	0.334	0.122	0.054	0.245	0.527
						SDNW Lake Littoral	0.669	0.037	0.016	0.628	0.711
Nemata (%)	No	1.000	γ	-	-	Reference Lake 3	4.0%	5.6%	2.5%	0.0%	13.5%
						SDNW Lake Littoral	1.1%	0.7%	0.3%	0.0%	2.0%
Hydracarina (%)	No	0.345	β, δ, γ	-	-	Reference Lake 3	3.6%	2.0%	0.9%	1.8%	6.7%
						SDNW Lake Littoral	4.2%	5.1%	2.3%	0.0%	11.3%
Ostracoda (%)	Yes	0.001	β, δ, γ	0.998	-2.2	Reference Lake 3	46.9%	17.5%	7.8%	37.8%	78.0%
						SDNW Lake Littoral	9.2%	6.1%	2.7%	3.7%	19.1%
Chironomidae (%)	Yes	0.002	β, δ, γ	0.992	2.1	Reference Lake 3	45.4%	18.8%	8.4%	15.4%	59.2%
						SDNW Lake Littoral	85.0%	6.6%	2.9%	76.3%	92.7%
Metal-Sensitive Chironomidae (%)	No	0.713	β, δ, γ	-	-	Reference Lake 3	19.3%	8.3%	3.7%	7.7%	28.1%
						SDNW Lake Littoral	24.6%	15.2%	6.8%	6.6%	41.0%
Scrapers (%)	No	0.571	β, δ, γ	-	-	Reference Lake 3	0.2%	0.4%	0.2%	0.0%	0.8%
						SDNW Lake Littoral	0.1%	0.3%	0.1%	0.0%	0.7%
Collector-Gatherers (%)	**Yes**	**0.025**	**β, δ, γ**	**0.805**	**-1.6**	Reference Lake 3	75.0%	11.4%	5.1%	61.1%	89.7%
						SDNW Lake Littoral	56.8%	7.7%	3.4%	47.6%	66.9%
Filterers (%)	No	0.803	β, ε, γ	-	-	Reference Lake 3	16.1%	8.4%	3.8%	7.0%	26.4%
						SDNW Lake Littoral	23.0%	17.3%	7.7%	3.7%	41.0%
Clingers (%)	No	0.922	β, δ, γ	-	-	Reference Lake 3	19.2%	7.6%	3.4%	8.8%	28.3%
						SDNW Lake Littoral	19.2%	5.8%	2.6%	11.0%	26.4%
Sprawlers (%)	No	0.095	γ	-	-	Reference Lake 3	65.7%	12.1%	5.4%	57.2%	85.7%
						SDNW Lake Littoral	53.0%	13.3%	6.0%	44.6%	75.6%
Burrowers (%)	No	0.156	β, δ	-	-	Reference Lake 3	15.1%	6.2%	2.8%	5.5%	22.2%
						SDNW Lake Littoral	27.8%	13.5%	6.0%	7.7%	44.2%

[a] Data analysis included: α - data untransformed; β - data logit transformed; ι - log_{10} transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

[b] Magnitude calculated by comparing the difference between the reference area and mine-exposed area means divided by the reference area standard deviation.

(grey box) Highlighted values indicate significant differences between study areas based on ANOVA p-value less than 0.10 that were also outside of a Critical Effect Size of ±2 SD, suggesting an ecologically meaningful difference.

BOLD Bold text values indicate significant differences between study areas based on ANOVA p-value less than 0.10, but a Critical Effect Size within ±2 SD, suggesting the difference is not ecologically meaningful.

community was not unusually skewed towards relatively few taxa and thus, was not adversely altered.

Benthic invertebrate community structural differences were suggested between Sheardown Lake NW and Reference Lake 3 littoral habitats based on significantly higher Bray-Curtis Index at Sheardown Lake NW, and by significant differences in the relative abundance of dominant taxonomic groups and FFG between lakes (Table 4.4). Similar to Camp Lake, a significantly lower and higher relative abundance of Ostracoda (seed shrimp) and Chironomidae (non-biting midges) occurred, respectively, at Sheardown Lake NW compared to the reference lake. However, the relative abundance of metal-sensitive Chironomidae did not differ significantly between Sheardown Lake NW and Reference Lake 3 (Table 4.4), and therefore the difference in benthic invertebrate community structure between lakes did not appear to be associated with an ecological response to aqueous and/or sediment metals exposure. Rather, a significantly lower relative abundance of FFG collector-gatherers (which include seed shrimp) at Sheardown Lake NW compared to the reference lake (Table 4.4) suggested that the difference in benthic invertebrate community structure between lakes was related to differences in food resources. Because collector-gatherers are deposit feeders of coarse organic matter, the occurrence of significantly lower proportion of FFG collector-gatherers was consistent with significantly lower sediment TOC content at littoral stations of Sheardown Lake NW compared to Reference Lake 3 (Table 4.4). Benthic invertebrate community structural differences between Sheardown Lake NW and Reference Lake 3 did not appear to reflect different habitat conditions between littoral areas of these lakes given the lack of significant differences in HPG (Table 4.4). This was supported by sediment particle size analysis, which indicated that the proportion of dominant sand and silt particle sizes in sediment did not differ significantly between lakes (Appendix Table D.14).

Temporal comparisons of the Sheardown Lake NW benthic invertebrate community data indicated no significant differences in density, richness or Simpson's Evenness in 2016 compared to the 2007 and 2013 baseline studies (Figure 4.14; Appendix Table F.30). In addition, among the three dominant taxonomic groups and two FFG examined, only the relative abundance of Chironomidae differed significantly between the mine-operational and baseline periods at Sheardown Lake NW (Figure 4.14). However, this difference only occurred for data collected between 2015 and the baseline studies, and because there was no significant difference in the relative abundance of metal-sensitive Chironomidae in 2016 versus the baseline studies (Figure 4.14; Appendix Table F.30), no adverse mine-related response was suggested. Moreover, no consistent differences in benthic invertebrate community density, richness, Simpson's Evenness, FFG or HPG were indicated between Sheardown Lake NW

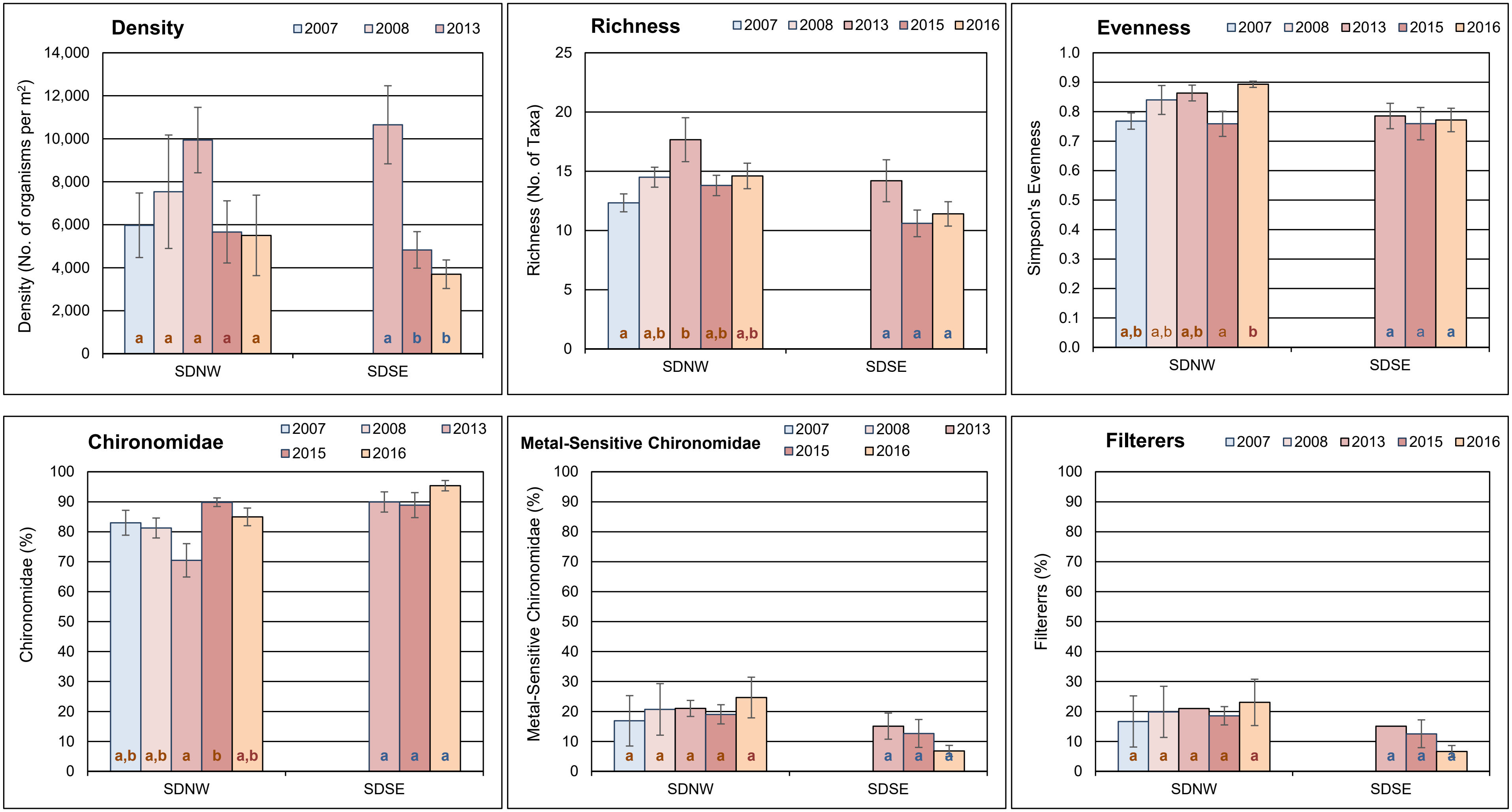

Figure 4.14: Comparison of key benthic invertebrate metrics (mean ± SE) at Sheardown Lake northwest (SDNW) and southeast (SDSE) basin littoral stations between mine baseline (2007, 2008 and 2013) and operational (2015, 2016) periods, Mary River Project CREMP, 2016. The same like-coloured letter inside bars indicate no significant difference among study years for respective lake basins.

and Reference Lake 3 littoral stations in both the 2015 and 2016 studies (Figure 4.14; Appendix Table F.30). Collectively, these results suggested no clear changes in benthic invertebrate community features in 2015/2016 compared to the baseline period, and specifically, no adverse influences associated with the recent initiation of mine operations at the Mary River Project.

4.2.5 Fish Population

4.2.5.1 Sheardown Lake NW Fish Community

Arctic charr was the only fish species captured at the northwest basin of Sheardown Lake in 2016, which differed slightly from that of Reference Lake 3 where low numbers of nine-spine stickleback were captured in nearshore rocky areas in addition to Arctic charr (Table 4.5). Total fish CPUE was much higher at Sheardown Lake NW than at the reference lake for nearshore electrofishing and for littoral/profundal gill net sampling (Table 4.5), suggesting higher densities and/or productivity of Arctic charr at Sheardown Lake. Greater numbers of fish, together with higher chlorophyll a concentrations and greater benthic invertebrate density, suggested that overall biological productivity was higher at Sheardown Lake NW than at Reference Lake 3.

Temporal comparison of the Sheardown Lake NW electrofishing catch data indicated similar Arctic charr CPUE over the mine baseline (2006-2013), construction (2014) and operational (2015, 2016) periods at nearshore rocky habitat of the lake (Figure 4.15). In addition, the 2016 Arctic charr CPUE for gill net sampling was within the range shown during the baseline period (Figure 4.15). These results suggested that the relative abundance of Arctic charr at the nearshore and littoral/profundal areas of Sheardown Lake NW remained similar between the 2016 mine operational and baseline studies, which in turn, suggested no mine-related influences to Arctic charr numbers in the lake.

4.2.5.2 Sheardown Lake NW Fish Population Assessment

Nearshore Arctic Charr

Mine-related influences on the Sheardown Lake NW nearshore Arctic charr population were assessed using a control-impact analysis using data collected from Sheardown Lake NW and Reference Lake 3 in 2016, as well as a before-after analysis using data collected from Sheardown Lake NW in 2016 and during 2013 baseline characterization. A total of 100 Arctic charr were captured at nearshore habitat of each of Sheardown Lake NW and Reference Lake 3 in August 2016 for the control-impact analysis. Distinction of Arctic charr YOY from the older, non-YOY age class was possible using a fork length cut-off of 5.0 and 5.1 cm based on evaluation of length-frequency distributions coupled with supporting age determinations for the

Table 4.5: Fish catch and community summary from backpack electrofishing and gill netting conducted at Sheardown Lake NW (DLO-01), Sheardown Lake SE (DLO-02) and Reference Lake 3 (REF3), Mary River Project CREMP, August 2016.

Lake	Method [a]		Arctic Charr	Nine-spine Stickleback	Total by Method	Total No. of Species
Reference Lake 3	Electrofishing	No. Caught	101	28	129	2
		CPUE	0.48	0.16	0.64	
	Gill netting	No. Caught	14	0	14	
		CPUE	0.15	0	0.15	
Sheardown Lake Northwest	Electrofishing	No. Caught	106	0	106	1
		CPUE	5.26	0	5.26	
	Gill netting	No. Caught	93	0	93	
		CPUE	1.71	0	1.71	
Sheardown Lake Southeast	Electrofishing	No. Caught	109	19	128	2
		CPUE	2.69	0.47	3.16	
	Gill netting	No. Caught	83	0	83	
		CPUE	8.06	0	8.06	

[a] Catch-per-unit-effort (CPUE) for electrofishing represents the number of fish captured per electrofishing minute, and for gill netting represents the number of fish captured per 100 m hours of net.

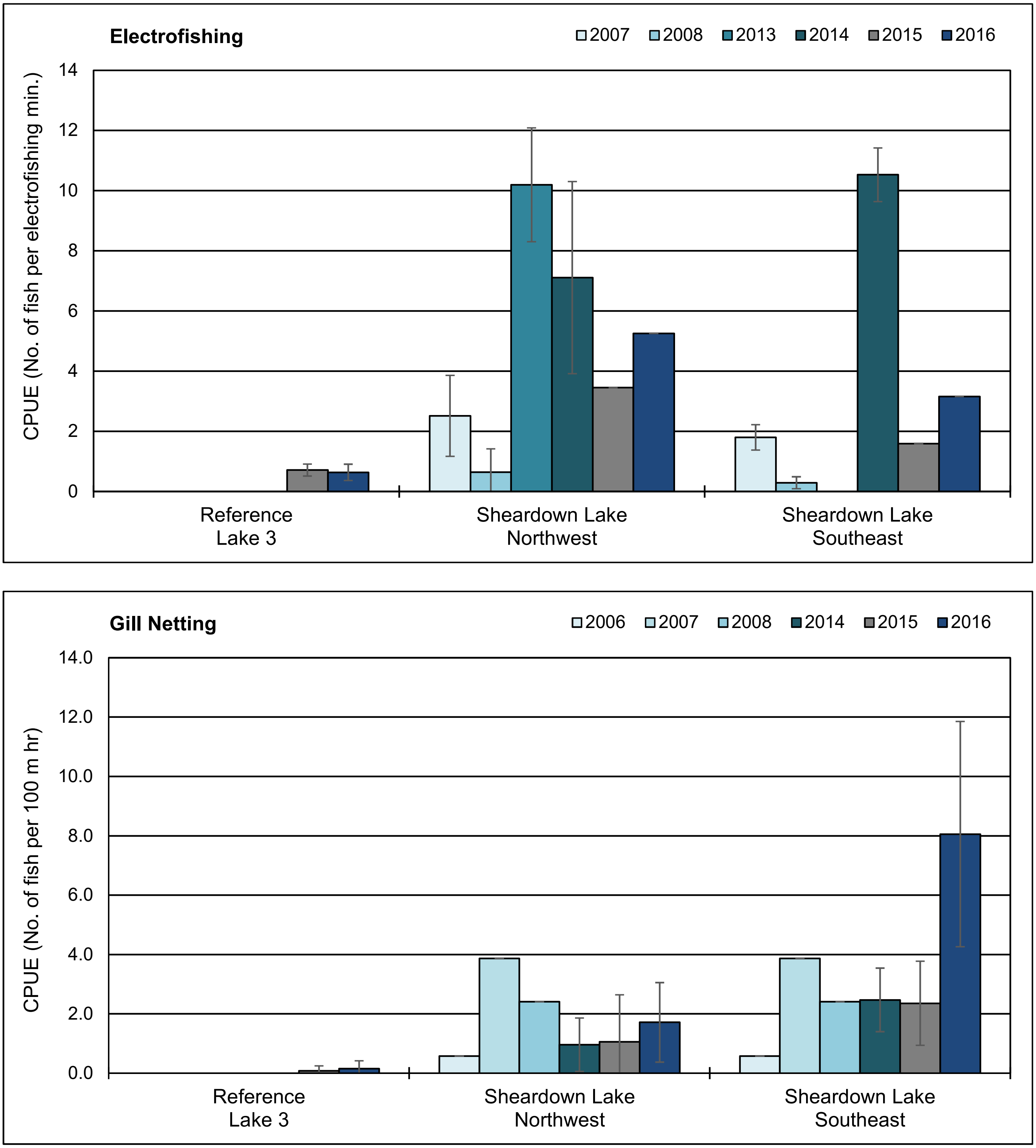

Figure 4.15: Catch-per-unit-effort (CPUE; mean ± SD) of Arctic charr captured by backpack electrofishing and gill netting at Sheardown Lake NW (DLO-01) and Sheardown Lake SE (DLO-02) for baseline (2006, 2007, 2008, 2013), mine construction (2014) and operational (2015, 2016) periods in the fall, Mary River Project CREMP. Lake basins (i.e., NW or SE) were not differentiated historically for baseline gill netting catches.

Sheardown Lake NW and Reference Lake 3 data sets, respectively (Figure 4.16). The nearshore Arctic charr health comparisons involved separate assessment of the YOY and non-YOY data sets to account for naturally differing weight-at-length relationships that occur between these life stages.

Length-frequency distributions for the nearshore Arctic charr differed significantly between Sheardown Lake NW and Reference Lake 3 (Table 4.6), potentially reflecting a lower proportion of YOY and larger mean size of individuals captured at Sheardown Lake NW. Arctic charr YOY and non-YOY were significantly heavier and longer at the Sheardown Lake NW nearshore than at the reference lake nearshore (Table 4.6; Appendix Tables G.18 and G.19). In addition, Arctic charr captured at the Sheardown Lake NW nearshore grew significantly faster than those collected from the reference lake nearshore (Table 4.6; Appendix Tables G.18 and G.19). The magnitude of the differences in weight-based size and growth were outside of the ±25% CES_G, suggesting an ecologically meaningful difference in energy use between nearshore Arctic charr populations of Sheardown Lake NW and Reference Lake 3 for both the YOY and non-YOY size categories. However, no significant differences in condition (i.e., weight-at-length relationship) were indicated between nearshore Arctic charr populations of Sheardown Lake NW and Reference Lake 3 for both the YOY and non-YOY size categories in 2016 (Table 4.6; Appendix Tables G.18 and G.19). Overall, Arctic charr of the Sheardown Lake NW nearshore were significantly larger and grew significantly faster, but exhibited similar condition, compared to those of the reference lake. Similar to the fish population results at Camp Lake, the occurrence of significantly faster growing Arctic charr with similar condition at Sheardown Lake NW compared to the reference area suggested no adverse mine-related influences on Arctic charr health for juveniles residing within Sheardown Lake NW in 2016.

Temporal comparisons of the Sheardown Lake NW nearshore Arctic charr data indicated significantly different length-frequency distribution between the 2016 mine operational study and 2007/2013 baseline study data (Table 4.6; Appendix Table G.20). In addition, Arctic charr captured at the nearshore of Sheardown Lake NW in 2016 were significantly lighter and of significantly lower condition than those captured during mine baseline characterization (Table 4.6). For each of the significantly differing nearshore Arctic charr endpoints between 2016 and the baseline data, the magnitude of difference was outside of respective CES, suggesting that the differences were ecologically meaningful (Table 4.6; Appendix Table G.20). Although no differences in size were indicated, similar differences in nearshore Arctic charr condition were demonstrated between the previous 2015 mine operational study and the 2013 baseline study data (Table 4.6). Because a similar direction and magnitude of difference in juvenile Arctic charr condition was observed temporally at both Camp and

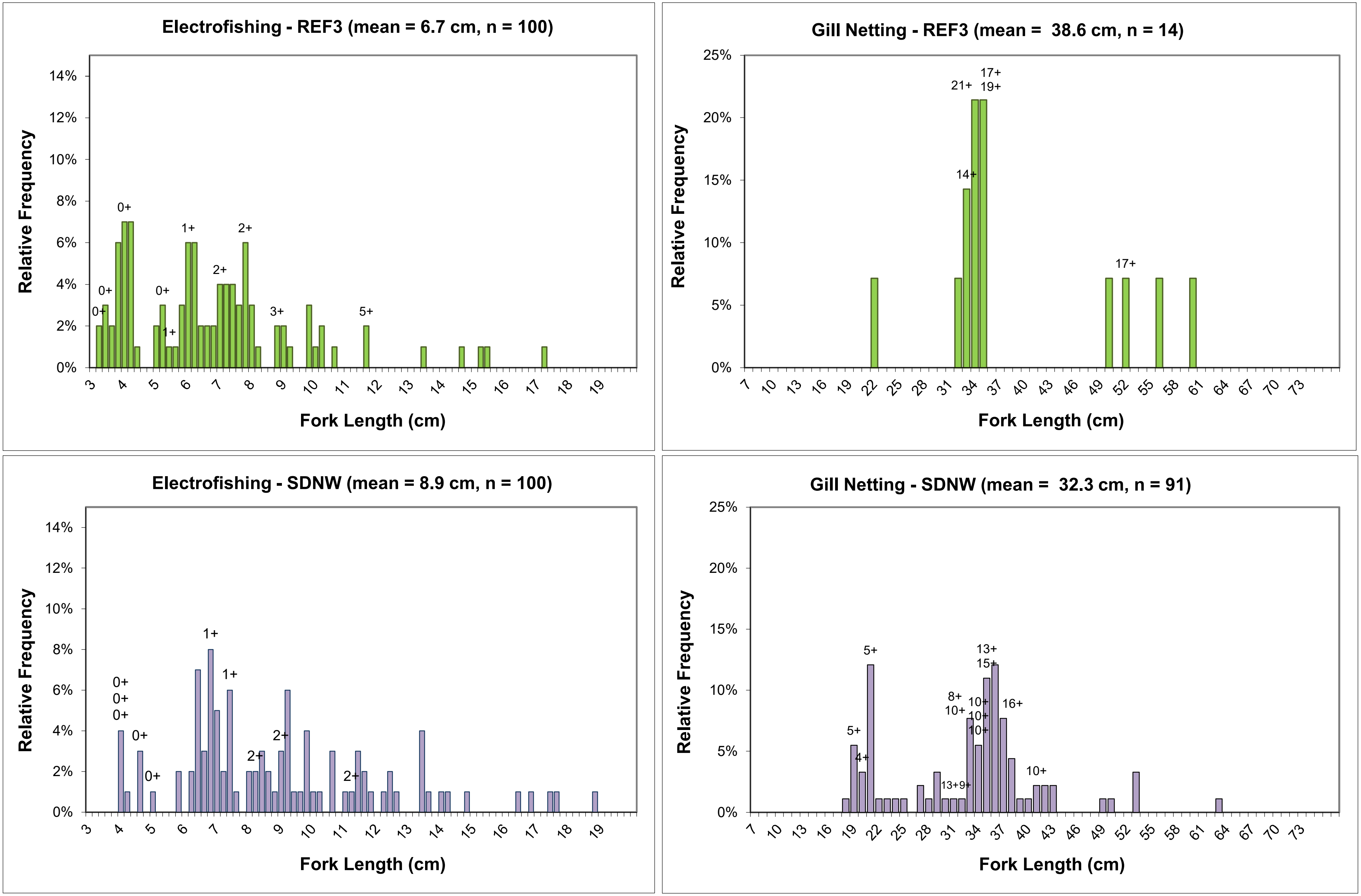

Figure 4.16: Length-frequency distributions for Arctic charr captured by backpack electrofishing and gill netting at Sheardown Lake NW (SDNW) and Reference Lake 3 (REF3), August 2016, Mary River Project CREMP. Fish ages are shown above the bars, where available.

Table 4.6: Summary of statistical results for Arctic charr population comparisons between Sheardown Lake NW and Reference Lake 3 for the mine operational period (2015, 2016) and between Sheardown Lake NW mine-operational and baseline period data for fish captured by electrofishing and gill netting methods, Mary River Project CREMP, August 2016. Values in parentheses indicate direction and magnitude of any significant differences.

Data Set by Sampling Method	Response Category	Endpoint	Statistically Significant Differences Observed?			
			versus Reference Lake 3		versus Sheardown Lake NW baseline period data [b]	
			2015	2016	2015	2016
Nearshore Electrofishing	Survival	Length-Frequency Distribution	**Yes**	**Yes**	**Yes**	**Yes**
		Age	No	No	No	-
	Energy Use	Size (mean weight)	**Yes (+121%)**	**Yes (+60%)**	No	**Yes (-29%)**
		Size (mean fork length)	**Yes (+29%)**	**Yes (+17%)**	No	No
		Growth (weight-at-age)	**Yes (+156%)**	**Yes (+66%)**	No	-
		Growth (fork length-at-age)	**Yes (+38%)**	**Yes (+24%)**	No	-
	Energy Storage	Condition (body weight-at-fork length)	**Yes (+3%)**	No	**Yes (-13%)**	**Yes (-12%)**
Littoral/Profundal Gill Netting [a]	Survival	Length Frequency Distribution	-	-	**Yes**	**Yes**
		Age	-	-	**Yes (-35%)**	**Yes (-28%)**
	Energy Use	Size (mean weight)	-	-	**Yes (-47%)**	**Yes (-31%)**
		Size (mean fork length)	-	-	**Yes (-21%)**	**Yes (-14%)**
		Growth (weight-at-age)	-	-	No	No
		Growth (fork length-at-age)	-	-	No	No
	Energy Storage	Condition (body weight-at-fork length)	-	-	**Yes (+8%)**	**Yes (+11%)**

[a] Due to low catches of Arctic charr at Reference Lake 3 in 2015 and 2016, no comparison of fish health was possible for gill netted fish.

[b] Baseline period data included 2002, 2005, 2006, 2008 and 2013 nearshore electrofishing data and 2006, 2008 and 2013 littoral/profundal gill netting data.

Sheardown Lake NW, this suggested that differences in condition between 2016 and the mine baseline periods likely reflected natural temporal variability.

Littoral/Profundal Arctic Charr

Mine-related influences on the Sheardown Lake NW littoral/profundal Arctic charr population were assessed using a before-after analysis between data collected in 2016 and the baseline characterization (combined 2006, 2007, 2008 and 2013) studies. Similar to the 2015 CREMP, a small sample size from Reference Lake 3 (i.e., n = 14) precluded meaningful control-impact statistical analysis using data collected in 2016. Biological information collected from Arctic charr mortalities indicated that non-spawners of reproductive age accounted for approximately 92% of the Sheardown Lake NW Arctic charr population at the time of sampling in August 2016 (Appendix Table G.23). The incidence rate for body cavity parasites was very high in the incidental Arctic charr mortalities (i.e., 86%), with sparse to very abundant occurrence of encysted worms and/or tapeworms observed in affected individuals (Appendix Table G.23). High incidence rates of internal parasites in Arctic charr were noted at Camp Lake in 2016, at all mine-exposed lakes in 2015 (Minnow 2016a), and at the various Mary River Project mine area lakes in baseline studies (NSC 2014, 2015a). One Arctic charr that had been tagged and released previously at Sheardown Lake NW was re-captured in 2016. This fish showed a 9.8 mm/year mean annual incremental increase in fork length over the approximately three years since being tagged (Table 4.7).

Table 4.7: Fork length and weight measurement data for tagged Arctic charr captured at Sheardown Lake NW in August 2016, Mary River Project CREMP.

Fish Tag Number	Capture Information			Re-Capture Information			Growth Rate
	Date of Capture	Length (mm)	Weight (g)	Date of Capture	Length (mm)	Weight (g)	Δ Length (mm/yr)
77647	30-Aug-2013	330	400	12-Aug-2016	359	470	9.8

The length-frequency distribution for Arctic charr captured at littoral/profundal areas of Sheardown Lake NW in 2016 differed significantly from those captured during baseline monitoring (Table 4.6; Figure 4.16). In part, the differences in length-frequency distribution may have reflected significantly younger and smaller individuals captured in 2016 compared to the baseline period (Table 4.6). Arctic charr growth did not differ significantly between 2016 and the baseline period at Sheardown Lake NW (Table 4.6; Appendix Table G.24). However, Arctic charr captured at littoral/profundal areas of Sheardown Lake NW exhibited significantly greater condition in 2016 than during baseline monitoring, at a magnitude of the difference slightly outside of the ecologically relevant CES_C of ±10% (Table 4.6; Appendix Table G.24). Notably, the same type and direction of differences in length-frequency distribution, age, mean size and condition for Arctic charr captured at littoral/profundal areas of Sheardown Lake NW were consistently demonstrated in 2015 and 2016 relative to the mine baseline data (Table 4.6). Overall, the lack of significant differences in growth combined with significantly greater condition of Arctic charr captured at littoral/profundal areas of Sheardown Lake NW in 2016 versus the baseline period suggested no adverse mine-related influences on the adult Arctic charr population of the lake as a result of on-going mine operation.

4.3 Sheardown Lake SE (DLO-2)

4.3.1 Water Quality

Vertical water quality profiles of *in-situ* water temperature, dissolved oxygen, pH and specific conductance conducted at Sheardown Lake SE showed no substantial station-to-station differences during any of the winter, summer or fall sampling events in 2016 (Appendix Figures C.14 to C.17). No thermal stratification was evident at the Sheardown Lake SE basin during any of the winter, summer or fall sampling events, and although gradually cooler water was observed with increased depth during summer and fall, no distinct layers had developed (Figure 4.17). The summer and fall water temperature profiles at Sheardown Lake SE were similar to those from the reference lake, with highest gradients in temperature with depth occurring between 5 - 10 m in summer and 10 – 17 m in fall (Figure 4.17). Mean water temperature near the bottom of the water column at littoral stations in fall 2016 did not differ significantly between Sheardown Lake SE and Reference Lake 3 (Figure 4.8; Appendix Table C.45). Notably, Sheardown Lake SE is a much smaller and shallower waterbody than Reference Lake 3 (see Figure 2.1; Appendix Table B.1), and therefore heat distribution patterns (i.e., thermal profiles) may be expected to differ naturally between these lakes.

Dissolved oxygen profiles conducted at Sheardown Lake SE in 2016 showed no change in dissolved oxygen saturation with depth during summer, but oxycline development characterized by decreasing saturation levels with increasing depth occurring at depths greater than 10 m during the winter and fall sampling events (Figure 4.17). No oxycline had developed in summer and fall at Reference Lake 3 in 2016 (Figure 4.17). Despite the differences in dissolved oxygen profiles, saturation levels at the bottom of the water column at littoral stations (i.e., approximately 10 m depth) did not differ significantly between the Sheardown Lake southeast basin and Reference Lake 3 during fall 2016 sampling (Figure 4.8; Appendix Tables C.44 – C.45). Dissolved oxygen saturation levels were generally well above the WQG of 54% at Sheardown Lake SE at all depths during the summer and fall sampling events in 2016

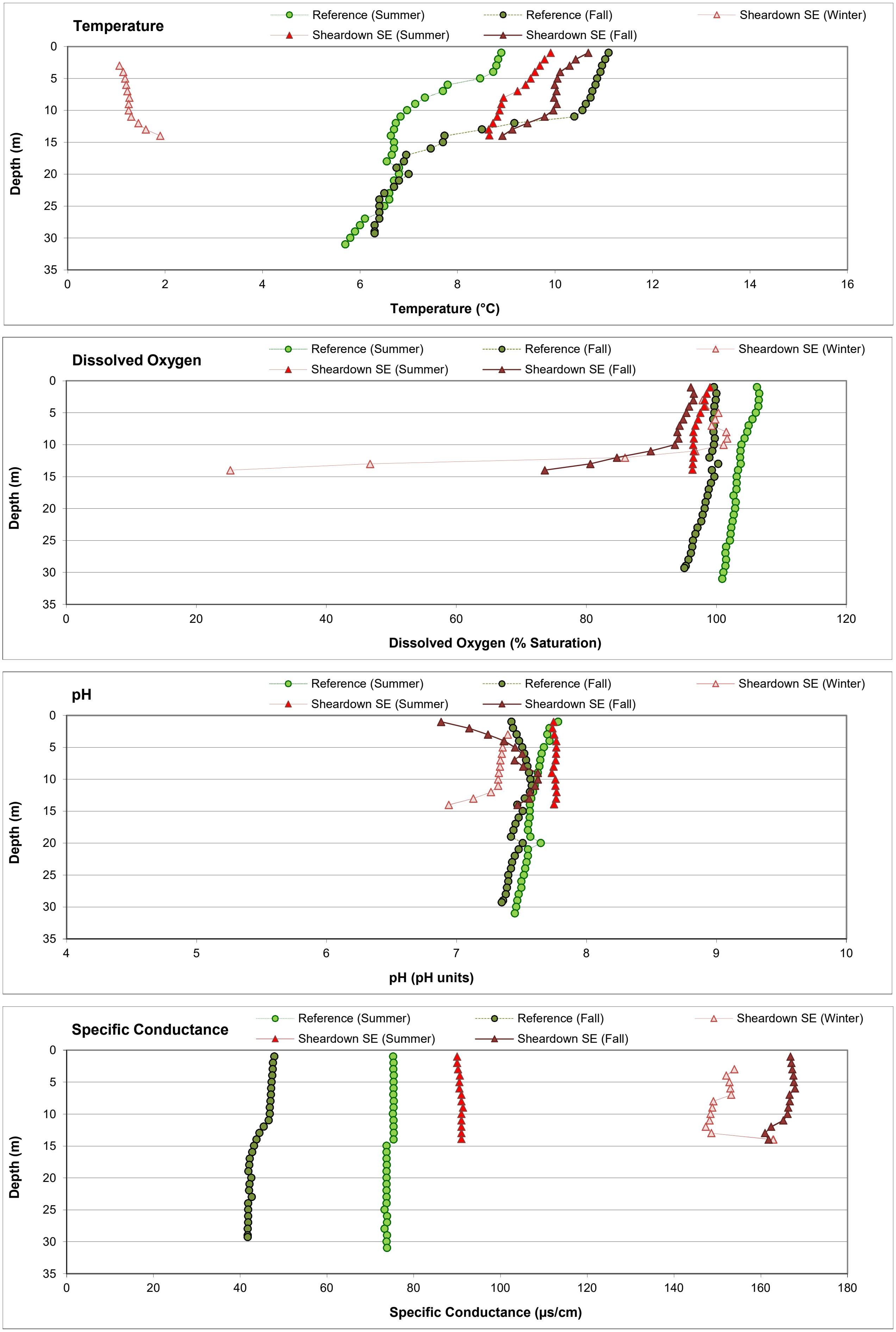

Figure 4.17: Average *in-situ* water quality with depth from surface at Sheardown Lake SE (mine-exposed area) compared to Reference Lake 3 during winter, summer, and fall sampling events, Mary River Project CREMP, 2016.

(Figure 4.8), indicating that dissolved oxygen was not likely to be limiting to pelagic or bottom-dwelling biota within the lake. However, dissolved oxygen saturation levels below 54% were observed at depths greater than 13 m during the winter at Sheardown Lake SE, the cause of which may be related to natural (e.g., sediment TOC content) or mine-related (e.g., current/ historical STP inputs) influences to lake dissolved oxygen levels.

In-situ profiles of pH and specific conductance showed no substantial change from the surface to the bottom of the Sheardown Lake SE water column, indicating no chemical stratification (Figure 4.17). Similar to the northwest basin, no significant differences in bottom pH at littoral stations were indicated between Sheardown Lake SE and Reference Lake 3 during the 2016 fall sampling, with pH at the southeast basin of Sheardown Lake also consistently within WQG limits in 2016 (Figure 4.8; Appendix Tables C.44; Figure 4.17). Specific conductance was significantly higher at Sheardown Lake SE compared to the reference lake during 2016 fall sampling (Figure 4.8). However, specific conductance at Sheardown Lake SE was intermediate to that of the reference creek and river areas (i.e., mean of 101 and 133 µS/cm, respectively) in fall 2016, and therefore the extent to which higher specific conductance at Sheardown Lake SE was related to natural regional variability or a mine-related influence was unclear. Water clarity at the southeast basin of Sheardown Lake was the lowest among the mine-exposed lakes. Secchi depth readings from Sheardown Lake SE were significantly lower (shallower) than at Reference Lake 3 during the 2016 fall sampling event, but were relatively consistent among stations, suggesting no spatial differences in water clarity of the lake (Appendix Tables C.44 – C.45).

Water chemistry at Sheardown Lake SE showed no consistent spatial differences in parameter concentrations among the five sampling stations during any of the winter, summer or fall sampling events in 2016 (Table 4.8; Appendix Table C.46), suggesting that the lake waters were generally well mixed both laterally and vertically. Total aluminum concentrations were highly elevated (i.e., ≥10-fold), turbidity and concentrations of total manganese moderately elevated (i.e., 5- to 10-fold), and concentrations of phenols and total molybdenum slightly elevated (i.e., 3- to 5-fold), at Sheardown Lake SE compared to Reference Lake 3 during the 2016 summer and fall sampling events (Table 4.8; Appendix Tables C.40 and C.46). Similar to the northwest basin, aluminum and manganese concentrations showed strong and modest positive correlations with turbidity, respectively, for the Sheardown Lake SE combined data set (i.e., winter, summer and fall data; r^2 = 0.90 and 0.60, respectively), suggesting that much of the aqueous aluminum and manganese was associated with suspended particles. This was corroborated by comparison of total and dissolved fractions for these metals, which indicated that most (i.e., ≥75%) was in particulate form at Sheardown Lake SE (compare Appendix

Table 4.8: Water chemistry at Sheardown Lake SE (DLO-02) and Reference Lake 3 (REF3) monitoring stations, Mary River Project CREMP, August 2016. Values presented are averages of samples taken from the surface and the bottom of the water column at each station.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Reference Lake 3 Average (n = 3)	Sheardown Lake Southeast (SDSE) Station				
						DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3
					Fall 2016	21-Aug-16	21-Aug-16	21-Aug-16	21-Aug-16	21-Aug-16
Conventionals[b]	Conductivity (lab)	umho/cm	-	-	84.3	118	116	116	115	113
	pH (lab)	pH	6.5 - 9.0	-	7.68	8.10	8.10	8.01	8.05	7.91
	Hardness (as $CaCO_3$)	mg/L	-	-	35	56	55	54	54	54
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	2.7	2.1	2.2	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	39	57	60	62	62	63
	Turbidity	NTU	-	-	0.33	2.05	2.21	2.45	2.40	2.62
	Alkalinity (as $CaCO_3$)	mg/L	-	-	33	52	52	52	53	52
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	0.040	<0.020	0.025	<0.020	0.032	0.036
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	0.022
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	0.16
	Dissolved Organic Carbon	mg/L	-	-	2.68	1.45	1.50	1.70	1.55	1.30
	Total Organic Carbon	mg/L	-	-	2.78	1.90	1.78	1.55	1.65	1.55
	Total Phosphorus	mg/L	0.020[α]	-	0.0099	0.0064	0.0115	0.0060	0.0119	0.0138
	Phenols	mg/L	0.004[α]	-	0.0031	0.0022	0.0025	0.0020	0.0299	0.0151
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.27	2.29	2.27	2.23	2.22	2.25
	Sulphate (SO_4)	mg/L	218[β]	218	4.07	2.71	2.65	2.59	2.62	2.57
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0042	0.052	0.051	0.070	0.052	0.059
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00653	0.00618	0.00637	0.00659	0.00630	0.00622
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	6.99	11.05	11.15	10.95	11.1	10.65
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00082	0.001	0.00115	0.00105	0.0011	0.001
	Iron (Fe)	mg/L	0.30	0.300	<0.030	0.0575	0.0525	0.0765	0.0565	0.066
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.00010	<0.00010	<0.00010	<0.00010	0.000105
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	4.26	6.45	6.39	6.31	6.34	6.11
	Manganese (Mn)	mg/L	0.935[β]	-	0.00062	0.00373	0.00365	0.00451	0.00386	0.00561
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000136	0.000497	0.00050625	0.0004925	0.0004955	0.000459
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.000665	0.0007	0.000705	0.0007	0.00069
	Potassium (K)	mg/L	-	-	0.89	0.93	0.92	0.93	0.92	0.90
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.420	0.687	0.615	0.667	0.617	0.685
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)	mg/L	-	-	0.836	1.140	1.135	1.120	1.125	1.110
	Strontium (Sr)	mg/L	-	-	0.0081	0.0083	0.0085	0.0084	0.0085	0.0082
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	0.00234	0.00204	0.00327	0.00220	0.00275
	Uranium (U)	mg/L	0.015	-	0.000270	0.000798	0.000811	0.0007975	0.0007975	0.000748
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)	mg/L	-	-		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

[a] Canadian Water Quality Guideline (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake SE.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

(shaded box) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Tables C.46 and C.47). Higher turbidity at Sheardown Lake SE, and lower water clarity (Secchi depth) associated with this turbidity, likely reflected backflow received from the Mary River, which directly affects water levels and chemistry of the southeast basin during moderate to high flow periods. In contrast to aluminum and manganese, molybdenum concentrations at Sheardown Lake SE were not associated with greater turbidity, suggesting that slight elevation molybdenum compared to Reference Lake 3 was related to mine operation and/or natural geochemical differences between these lakes. Despite elevation of these metals at Sheardown Lake SE, concentrations of most parameters were well below established WQG and AEMP benchmarks during the winter, summer and fall sampling events in 2016[10] (Table 4.8; Appendix Table C.46), suggesting no adverse influences of water quality on biota of Sheardown Lake SE in 2016.

Temporal comparisons of the Sheardown Lake SE water chemistry data indicated no appreciable changes in average concentrations of parameters between the 2016 study and mine baseline (2005 – 2013) period (Figure 4.9; Appendix Figure C.18). This suggested that the differences in water chemistry between Sheardown Lake SE and Reference Lake 3 in 2016 likely reflected natural differences in mineralogy/geochemical conditions between lakes. Nevertheless, conductivity, hardness and concentrations of chloride, manganese, nickel, sodium, strontium, sulphate and uranium were consistently greater at all Sheardown Lake SE stations in 2016 compared to the previous years of mine construction (2014) and initial operation (2015; Figure 4.9; Appendix Figure C.18). Higher concentrations of these parameters in 2016 may have reflected natural temporal variability in water chemistry, but may also indicate a more recent, slight mine-related influence on water quality of Sheardown Lake SE.

4.3.2 Sediment Quality

Surficial sediment at Sheardown Lake SE littoral stations was uniformly composed of compact silty loam material with low TOC content (Figure 4.18). Substrate at littoral stations of Sheardown Lake SE contained significantly lower sand and TOC content, but significantly greater silt and clay content, than at Reference Lake 3 (Appendix Table D.19). The high proportion of fines in substrate of Sheardown Lake SE potentially reflects the receipt of Mary River backflow during high flow periods, which can be expected to result in the deposition of high quantities of naturally suspended, fine-grained material. Similar to observations at the other mine-exposed lakes and the reference lake, iron (oxy)hydroxide material was visible in surficial and/or sub-surface substrate of Sheardown Lake SE, in some cases occurring as a

[10] Refer to footnote 2 (page 23) and Appendix B regarding phenol concentrations above WQG at the mine-exposed and reference areas of the Mary River Project LSA waterbodies.

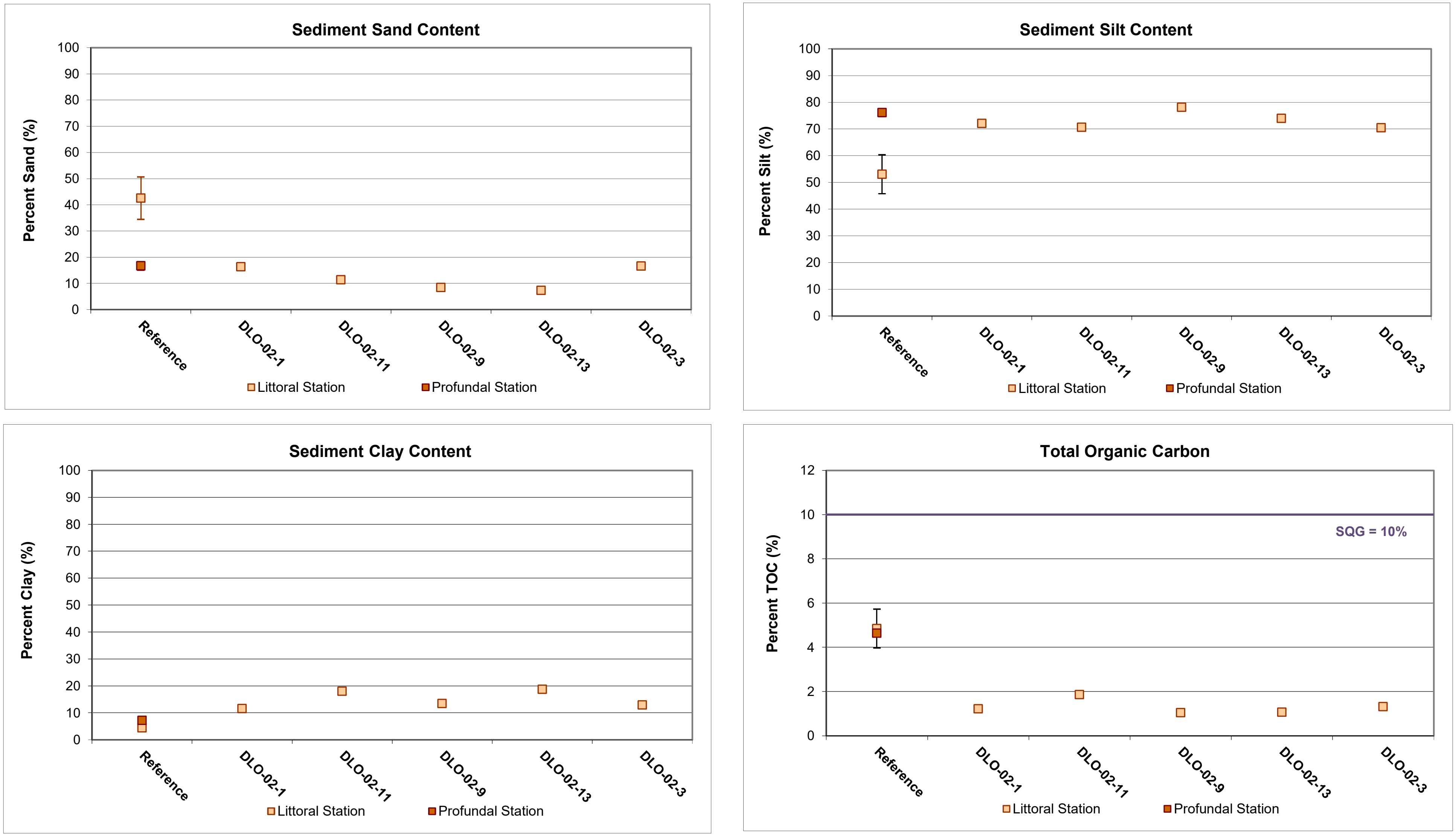

Figure 4.18: Sediment particle size and total organic carbon (TOC) content comparisons among Sheardown Lake SE (DLO-02) sediment monitoring stations and Reference Lake 3 averages (mean ± SE), Mary River Project CREMP, August 2016.

thin, distinct layer (Appendix Tables D.17 – D.18). Below the surficial layer, substrates at Sheardown Lake SE littoral stations exhibited some sporadic blackening and, at one station, had a slight sulphidic odour, suggesting development of reducing conditions. However, no distinct redox boundary was observed in the littoral station sediments (Appendix Tables D.17 - D.18). Observations regarding reducing sediment conditions at Sheardown Lake SE were similar to those made at Reference Lake 3 in 2016 (Appendix Tables D.1 – D.3 and D.17 – D.18), suggesting that factors leading to reduced sediment conditions were comparable between lakes.

Sediment metal concentrations at Sheardown Lake SE showed no spatial gradients with progression towards the lake outlet in 2016, suggesting no clear point sources of metals to the lake (Appendix Table D.20). With the exception of slightly elevated manganese concentrations, sediment metal concentrations at littoral stations of Sheardown Lake SE were, on average, similar to those observed at the reference lake littoral stations (Table 4.3; Appendix Tables D.20 – D.21). Mean iron and manganese concentrations were above respective SQG and AEMP benchmarks at the Sheardown Lake SE littoral stations, although concentrations of these metals were above SQG at only two of the five stations sampled (Table 4.3; Appendix Table D.20). As indicated previously, average concentrations of iron and manganese were also above respective SQG at profundal stations of Reference Lake 3 (Table 4.3). These results suggested that the elevation of iron and manganese concentrations in sediment of Sheardown Lake SE relative to SQG potentially reflected a natural phenomenon at lakes in the mine LSA.

Temporal comparisons of the sediment metals data suggested slightly elevated (i.e., 2- to 5-fold higher) average concentrations of arsenic and manganese at littoral stations of Sheardown Lake SE in 2016 compared to the baseline (2005 – 2013) period[11] (Figure 4.11; Appendix Table D.21). Arsenic and manganese showed progressively higher mean concentrations in 2015 and 2016 compared to the baseline/mine construction periods at littoral stations of Sheardown Lake SE (Figure 4.11). However, as at the other mine-exposed lakes, variability in parameter concentrations was high and neither parameter occurred at concentrations greater than at the reference lake littoral and/or profundal stations (Figure 4.11). This suggested that, similar to the other mine-exposed lakes, slight variation in station locations and/or data treatment among studies likely contributed to the appearance of higher mean concentrations of arsenic and manganese in sediment at the Sheardown Lake SE littoral stations in 2015 and 2016 compared to the baseline period. Nevertheless, because arsenic

[11] Refer to footnote 6 (page 32) regarding temporal differences in sediment boron concentrations at Mary River Project LSA waterbodies.

and/or manganese showed progressively higher mean concentrations in sediment at all the other mine-exposed lakes, and despite similarity to the reference lake sediment metal concentrations, greater concentrations of these parameters in sediment at the Sheardown Lake SE littoral stations over time potentially reflected a mine-related influence.

4.3.3 Phytoplankton

Chlorophyll a concentrations at Sheardown Lake SE showed no spatial gradients with closer proximity to the lake outlet during any of the winter, summer or fall sampling events in 2016 (Figure 4.12). Chlorophyll a concentrations were significantly higher in the fall than during the either the winter or summer seasons in 2016, with comparable concentrations shown between the latter (Appendix Table E.10). Similar to Camp Lake and Sheardown Lake NW, chlorophyll a concentrations at the Sheardown Lake SE were significantly higher than at the reference lake for both the summer and fall sampling events in 2016 (Appendix Table E.5 and E.6). Moreover, chlorophyll a concentrations were well below the AEMP benchmark of 3.7 µg/L at all but one of the Sheardown Lake SE stations during the winter, summer and fall sampling events in 2016 (Figure 4.12). On average, chlorophyll a concentrations at Sheardown Lake SE fell within an 'oligotrophic' trophic status as defined by Wetzel (2001), although chlorophyll a concentrations at individual stations fell near the maxima for this designation during the fall 2016 sampling event. Mean aqueous total phosphorus concentrations at Sheardown Lake SE were also near the oligotrophic-mesotrophic boundary designation of 10 µg/L during the 2016 summer and fall sampling events (Table 4.8; Appendix Table C.46).

Chlorophyll a concentrations were significantly higher in the summer and fall of 2016 than during the same seasons in 2014 and/or 2015 at Sheardown Lake SE, but no significant differences in chlorophyll a concentrations were shown among years for data collected in the winter (Appendix Table E.11). Annual average chlorophyll a concentrations were significantly higher in 2016 than 2015, and although concentrations did not differ significantly between 2014 and 2016, higher absolute concentrations in 2016 were suggestive of slightly increased primary productivity over time at Sheardown Lake SE, particularly during the ice-free period. This suggested that the trophic status may have increased at Sheardown Lake SE since the mine-construction period, potentially representing a mine-related influence to the lake. No chlorophyll a baseline (2005 – 2013) data are available for Sheardown Lake SE, precluding comparisons to conditions prior to the mine construction period.

4.3.4 Benthic Invertebrate Community

Benthic invertebrate density, richness and Simpson's Evenness at littoral stations did not differ significantly between Sheardown Lake SE and Reference Lake 3 in 2016 (Table 4.9).

Table 4.9: Benthic invertebrate community statistical comparison results between Southeast Sheardown Lake (DLO2) and Reference Lake 3 littoral stations, Mary River Project CREMP, August 2016.

Metric	Statistical Test Results					Summary Statistics					
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Power	Magnitude of Difference [b] (No. of SD)	Area	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Maximum
Density (Individuals/m^2)	No	0.189	α, δ, γ	-	-	Reference Lake 3	2,390	1,396	624	897	4,240
						SDSE Lake Littoral	3,700	1,485	664	2,343	6,225
Richness (Number of Taxa)	No	0.510	α, ε, γ	-	-	Reference Lake 3	12.2	1.1	0.5	11.0	14.0
						SDSE Lake Littoral	11.4	2.3	1.0	9.0	14.0
Simpson's (E) Krebs	No	0.548	γ	-	-	Reference Lake 3	0.758	0.189	0.084	0.420	0.849
						SDSE Lake Littoral	0.772	0.089	0.040	0.696	0.900
Bray-Curtis Index	Yes	<0.001	α, δ, γ	1.000	3.5	Reference Lake 3	0.334	0.122	0.054	0.245	0.527
						SDSE Lake Littoral	0.761	0.082	0.037	0.669	0.886
Nemata (%)	No	0.445	β, δ, γ	-	-	Reference Lake 3	4.0%	5.6%	2.5%	0.0%	13.5%
						SDSE Lake Littoral	1.1%	1.3%	0.6%	0.0%	2.9%
Ostracoda (%)	Yes	0.001	β, δ, γ	0.997	-2.6	Reference Lake 3	46.9%	17.5%	7.8%	37.8%	78.0%
						SDSE Lake Littoral	1.7%	2.5%	1.1%	0.0%	5.9%
Chironomidae (%)	Yes	0.000	β, δ, γ	1.000	2.7	Reference Lake 3	45.4%	18.8%	8.4%	15.4%	59.2%
						SDSE Lake Littoral	95.4%	3.9%	1.7%	89.7%	98.9%
Metal-Sensitive Chironomidae (%)	**Yes**	**0.020**	**β, δ, γ**	**0.838**	**-1.5**	Reference Lake 3	19.3%	8.3%	3.7%	7.7%	28.1%
						SDSE Lake Littoral	6.8%	4.2%	1.9%	1.9%	12.2%
Collector-Gatherers (%)	**Yes**	**0.045**	**β, δ, γ**	**0.697**	**-1.6**	Reference Lake 3	75.0%	11.4%	5.1%	61.1%	89.7%
						SDSE Lake Littoral	56.5%	12.8%	5.7%	42.6%	71.0%
Filterers (%)	**Yes**	**0.063**	**β, δ, γ**	**0.627**	**-1.1**	Reference Lake 3	16.1%	8.4%	3.8%	7.0%	26.4%
						SDSE Lake Littoral	6.7%	4.4%	2.0%	1.1%	12.2%
Clingers (%)	**Yes**	**0.056**	**γ**	**-**	**-1.5**	Reference Lake 3	19.2%	7.6%	3.4%	8.8%	28.3%
						SDSE Lake Littoral	8.1%	3.9%	1.8%	1.7%	12.0%
Sprawlers (%)	**Yes**	**0.054**	**β, δ, γ**	**0.661**	**-1.6**	Reference Lake 3	65.7%	12.1%	5.4%	57.2%	85.7%
						SDSE Lake Littoral	46.2%	14.0%	6.3%	28.0%	63.1%
Burrowers (%)	Yes	0.002	β, δ, γ	0.994	4.9	Reference Lake 3	15.1%	6.2%	2.8%	5.5%	22.2%
						SDSE Lake Littoral	45.6%	12.5%	5.6%	33.3%	64.6%

[a] Data analysis included: α - data untransformed; β - data logit transformed; ι - log_{10} transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

[b] Magnitude calculated by comparing the difference between the reference area and mine-exposed area means divided by the reference area standard deviation.

Highlighted values indicate significant differences between study areas based on ANOVA p-value less than 0.10 that were also outside of a Critical Effect Size of ±2 SD, suggesting an ecologically meaningful difference.

BOLD Bold text values indicate significant differences between study areas based on ANOVA p-value less than 0.10, but a Critical Effect Size within ±2 SD, suggesting the difference is not ecologically meaningful.

However, benthic invertebrate community structural differences were indicated between Sheardown Lake SE and reference lake littoral habitats based on significantly differing Bray-Curtis Index and by significant differences in the relative abundance of dominant taxonomic groups, FFG and HPG between lakes (Table 4.9). Similar to the northwest basin of Sheardown Lake, significant differences in the relative abundance of dominant taxonomic groups (i.e., seed shrimp and chironomids) and FFG between the Sheardown Lake SE and reference lake littoral stations were potentially linked to differing food resources between lakes. Specifically, a significantly lower sediment TOC content potentially accounted for lower relative abundance of seed shrimp and the collector-gatherer FFG at Sheardown Lake SE than at the reference lake. The analysis of HPG suggested that differences in habitat also could have accounted for benthic invertebrate community structural differences between Sheardown Lake SE and Reference Lake 3 littoral areas. For instance, a significantly higher relative abundance of burrowing benthic invertebrates was consistent with the occurrence of significantly higher proportion of fines (i.e., silt and clay) in substrate of Sheardown Lake SE compared to the reference lake (Appendix Table D.19). Finer substrate composition at Sheardown Lake SE would presumably provide more suitable habitat quality for burrowing invertebrates, thus accounting for some of the differences in community structure between Sheardown Lake SE and Reference Lake 3. Lower sediment TOC and differences in sediment particle size largely reflect natural differences in habitat features between Sheardown Lake SE and the reference lake, including potential influences of backflow from the Mary River to Sheardown Lake SE during periods of high flow that would result in the deposition of fines to the lake.

Temporal comparisons of the Sheardown Lake SE benthic invertebrate community data indicated significantly lower density in 2015 and 2016 mine operational years compared to 2013 baseline period data, but no significant differences in density between 2015 and 2016 (Figure 4.14; Appendix Table F.31). In addition, richness, Simpson's Evenness, and the relative abundance of dominant taxonomic groups and FFG did not differ significantly among the mine operational and mine baseline studies (Figure 4.14; Appendix Table F.31). Because density was the only benthic invertebrate community metric that differed among periods, natural variability in density among studies most likely accounted for this difference. This was supported by the facts that no significant difference in the proportion of metal-sensitive taxa was indicated among years (Figure 4.14) and parameter concentrations in water and sediment were below applicable WQG/SQG and AEMP benchmarks at Sheardown Lake SE in 2016[12]. Consistent differences in benthic invertebrate community dominant taxonomic groups, FFG

[12] Although sediment iron and manganese concentrations were above SQG at littoral stations of Sheardown Lake SE in 2016, concentrations of these metals were also above SQG at profundal stations of Reference Lake 3, suggesting iron concentrations were naturally high within the mine LSA lakes.

and HPG were indicated between Sheardown Lake SE and Reference Lake 3 littoral stations in both the 2015 and 2016 studies, in addition to an overall greater number of significantly differing endpoints in 2016 compared to 2015 (Table 4.9; Appendix Table F.31). This suggested that factors contributing to differences in benthic invertebrate community structure between Sheardown Lake SE and Reference Lake 3 in both 2015 and 2016 had remained relatively unchanged between years.

4.3.5 Fish Population

4.3.5.1 Sheardown Lake SE Fish Community

The Sheardown Lake SE fish community was composed of Arctic charr and ninespine stickleback, reflecting the same fish species composition as the reference lake in 2016 (Table 4.6). However, total fish CPUE was much higher at Sheardown Lake SE than at Reference Lake 3 for both electrofishing and gill netting collection methods, suggesting higher densities and/or productivity of both Arctic charr and ninespine stickleback at Sheardown Lake SE (Table 4.6). Consistent with the other mine lakes, greater numbers of Arctic charr, together with greater density of benthic invertebrates, suggested that productivity was higher at Sheardown Lake SE than at Reference Lake 3.

Temporal comparison of the Sheardown Lake SE electrofishing catch data indicated that fish CPUE was highly variable among the mine baseline (2007 - 2008), construction (2014) and operational (2015, 2016) studies (Figure 4.15). Nevertheless, the abundance of Arctic charr at nearshore habitat of Sheardown Lake SE following the initial two years of mine operation (i.e., 2015 – 2016) was within the range observed prior to mine start-up. Arctic charr CPUE for gill net collections was markedly higher in 2016 compared to all previous baseline (2006 – 2008), mine construction (2014) and mine operational (2015) studies (Figure 4.15). However, similar to 2016 results at Camp Lake, the higher CPUE at Sheardown Lake SE in 2016 likely reflected improvements in sampling efficiency from experienced gained through previous studies (see Minnow 2016b) rather than higher fish densities/productivity at the lake in 2016. Nevertheless, CPUE comparisons between studies suggested that the relative abundance of Arctic charr in Sheardown Lake SE had not been reduced in 2016 compared to baseline conditions or to the previous mine construction and mine operation years.

4.3.5.2 Sheardown Lake SE Fish Population Assessment

Nearshore Arctic Charr

Mine-related influences on the Sheardown Lake SE nearshore Arctic charr population were assessed with a control-impact analysis using data collected from Sheardown Lake SE and

Reference Lake 3 in 2016. Although before-after analysis of data collected from Sheardown Lake SE in 2016 (mine operation) and 2007 (baseline) was conducted, poor accuracy in fresh body weight measures during the baseline sampling precluded meaningful data interpretation and therefore these results were not discussed further herein. A total of 100 Arctic charr were captured at nearshore habitat of each of Sheardown Lake SE and Reference Lake 3 in August 2016 for the control-impact analysis. Distinction of Arctic charr YOY from the older, non-YOY age category was possible using a fork length cut-off of 5.0 and 5.1 cm based on evaluation of length-frequency distributions coupled with supporting age determinations for the Sheardown Lake SE and Reference Lake 3 data sets, respectively (Figure 4.19). Nearshore Arctic charr health comparisons were conducted separately for the YOY and non-YOY data sets to account for naturally differing weight-at-length relationships that occur between these age categories.

Length-frequency distributions for the nearshore Arctic charr differed significantly between Sheardown Lake SE and Reference Lake 3 (Table 4.10), potentially reflecting a greater prevalence of YOY and smaller mean size of individuals captured at Sheardown Lake SE (Figure 4.19). Although Arctic charr YOY were significantly heavier and longer at the Sheardown Lake SE nearshore than at the reference lake nearshore, the size of non-YOY did not differ significantly between lakes in 2016 (Table 4.10; Appendix Tables G.26 – G.27). Similar to the northwest basin, Arctic charr captured at the Sheardown Lake SE nearshore grew significantly faster than those collected from the reference lake nearshore (Table 4.10). The magnitude of the differences in weight- and length-based growth were well outside of the ecologically meaningful CES_G of ±25% between Sheardown Lake SE and the reference lake (Table 4.10). However, as at the northwest basin, no significant differences in condition of nearshore Arctic charr were indicated between Sheardown Lake SE and the reference lake for YOY and non-YOY individuals in 2016 (Appendix Tables G.26 – G.27). Similar to the other mine-exposed lakes, the occurrence of faster growing Arctic charr with similar condition to those of the reference lake suggested no adverse mine-related influences on fish energy use and storage at Sheardown Lake SE in 2016.

Littoral/Profundal Arctic Charr

Mine-related influences on the Sheardown Lake SE littoral/profundal Arctic charr population was assessed using a before-after analysis between data collected in 2016 and the baseline characterization (combined 2007/2008) studies. Similar to the 2015 CREMP, a small sample size from Reference Lake 3 (i.e., n = 14) precluded meaningful control-impact statistical analysis using data collected in 2016. Biological information collected from Arctic charr mortalities indicated that non-spawners of reproductive age constituted approximately 57% of

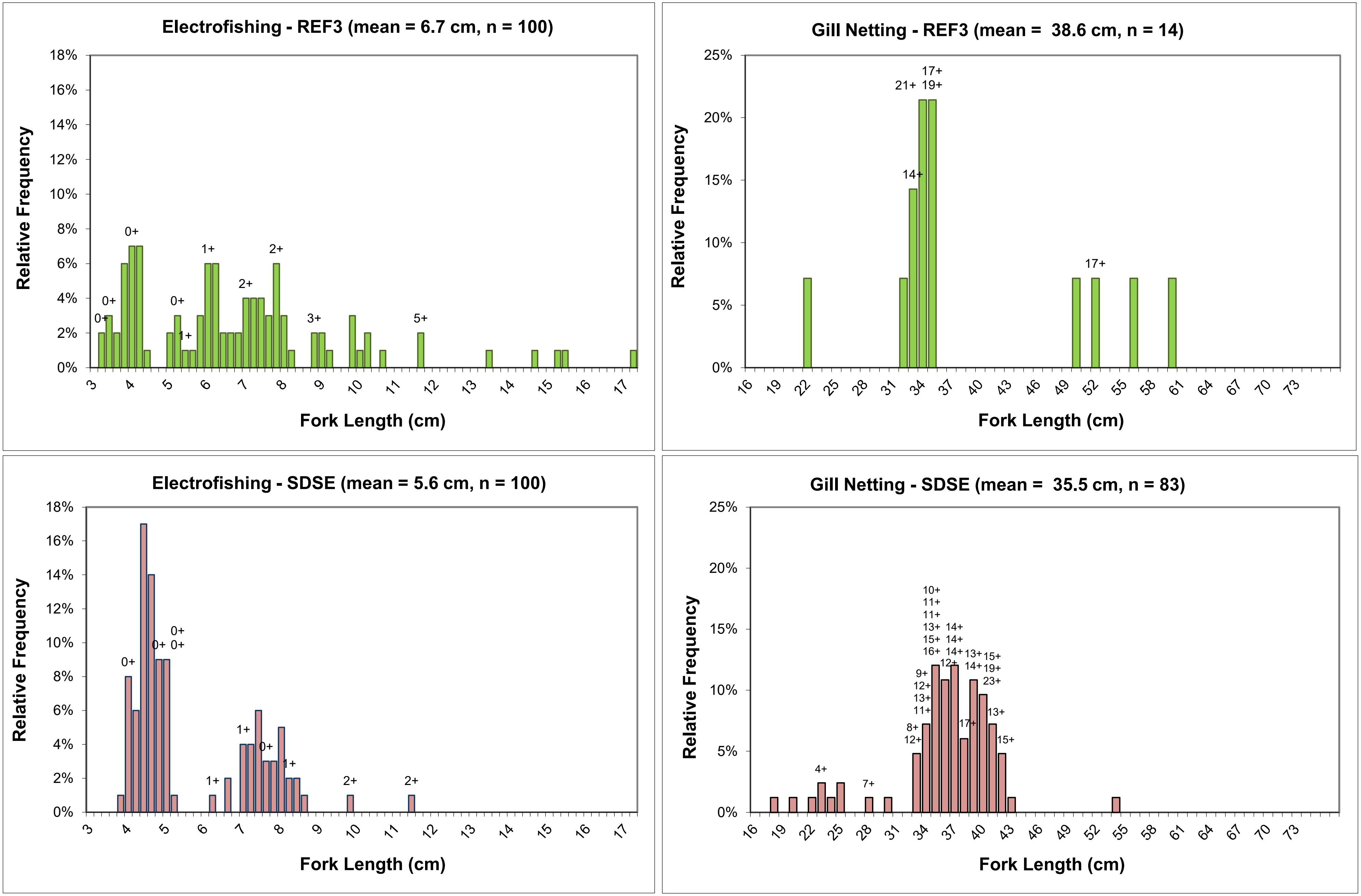

Figure 4.19: Length-frequency distributions for Arctic charr captured by backpack electrofishing and gill netting at Sheardown Lake SE (DLO-02) and Reference Lake 3 (REF3), Mary River Project CREMP, August 2016. Fish ages are shown above the bars, where available.

Table 4.10: Summary of statistical results for Arctic charr population comparisons between Sheardown Lake SE and Reference Lake 3 for the mine operational period (2015, 2016) and between Sheardown Lake SE mine-operational and baseline period data for fish captured by electrofishing and gill netting methods, Mary River Project CREMP, August 2016. Values in parentheses indicate direction and magnitude of any significant differences.

Data Set by Sampling Method	Response Category	Endpoint	Statistically Significant Differences Observed?			
			versus Reference Lake 3		versus Sheardown Lake SE baseline period data [b]	
			2015	2016	2015	2016
Nearshore Electrofishing	Survival	Length-Frequency Distribution	No	**Yes**	**Yes**	**Yes**
		Age	No	No	**Yes (+273%)**	-
	Energy Use	Size (mean weight)	No	No	No	**Yes (-43%)**
		Size (mean fork length)	No	No	**Yes (+7%)**	**Yes (-15%)**
		Growth (weight-at-age)	**Yes (+85%)**	**Yes (+120%)**	No	-
		Growth (fork length-at-age)	**Yes (+21%)**	**Yes (+34%)**	No	-
	Energy Storage	Condition (body weight-at-fork length)	**Yes (+4%)**	No	**Yes (-14%)**	**Yes (-16%)**
Littoral/Profundal Gill Netting [a]	Survival	Length Frequency Distribution	-	-	**Yes**	**Yes**
		Age	-	-	**Yes (-13%)**	No
	Energy Use	Size (mean weight)	-	-	**Yes (-26%)**	**Yes (-20%)**
		Size (mean fork length)	-	-	**Yes (-9%)**	**Yes (-7%)**
		Growth (weight-at-age)	-	-	**Yes (+18%)**	**Yes (+24%)**
		Growth (fork length-at-age)	-	-	No	No
	Energy Storage	Condition (body weight-at-fork length)	-	-	No	No

[a] Due to low catches of Arctic charr at Reference Lake 3 in 2015 and 2016, no comparison of fish health was possible for gill netted fish.
[b] Baseline period data included 2007 nearshore electrofishing data and 2007 and 2008 littoral/profundal gill netting data.

the Sheardown Lake SE Arctic charr population during the August 2016 field study (Appendix Table G.32). On average, Arctic charr non-spawners were younger and were slightly smaller, but showed no significant difference in LSI compared to those fish with developing gonads (Appendix Table G.32; ANOVA p = 0.464). A high proportion of individuals (i.e., 96%) contained body cavity parasites (Appendix Table G.32), the incidence rate of which was comparable to that observed at other mine-exposed lakes in 2015 and 2016, as well as during baseline studies.

Length-frequency distributions of Arctic charr captured at littoral/profundal areas of Sheardown Lake SE in 2016 differed significantly from those captured during the baseline period (Table 4.10). In part, the differences in length-frequency distribution may have reflected significantly smaller size (i.e., weight and length) of individuals captured in 2016 compared to the baseline period (Table 4.10; Appendix Table G.31). Significantly greater weight-related growth was indicated in 2016 compared to the baseline period for Arctic charr captured at littoral/profundal areas of Sheardown Lake SE, but the difference was within the ecologically meaningful CES_G of ±25% (Table 4.10; Appendix Table G.31). However, condition of Arctic charr from littoral/profundal areas of Sheardown Lake SE did not differ significantly between 2016 and the baseline period (Table 4.10). The Arctic charr data collected from littoral/profundal areas of Sheardown Lake SE between 2016 and the baseline periods generally showed the same type, direction and magnitude of differences that were shown during the 2015 CREMP (Table 4.10), suggesting no substantial changes in conditions between 2015 and 2016. Overall, the absence of any ecologically significant differences in growth and condition for Arctic charr captured at littoral/profundal areas of Sheardown Lake SE in 2016 compared to the baseline period suggested no adverse influences on adult Arctic charr following the initial two years of mine operation.

4.4 Synthesis of Mine-Related Influences within the Sheardown Lake System

4.4.1 Sheardown Lake Tributaries

At Sheardown Lake Tributary 1 (SDLT1), aqueous concentrations of several parameters were elevated compared to average concentrations observed at the reference creek stations in 2016. However, similar to the 2015 CREMP, only nitrate and sulphate concentrations were elevated at SDLT1 in 2016 compared to the baseline period and, with the exception of copper, no parameters were present at concentrations above WQG or AEMP benchmarks in 2016. Chlorophyll a concentrations were elevated at lower SDLT1 compared to reference creek stations in 2016, suggesting that elevated nitrate concentrations may have contributed to biological enrichment at SDLT1. However, similar chlorophyll a concentrations between 2016 and the baseline period indicated that SDLT1 may naturally exhibit greater phytoplankton growth than at the reference creek stations. The key differences in benthic invertebrate community metrics between SDLT1 and Unnamed Reference Creek in 2016 included lower richness and greater relative abundance of filterer FFG and burrower HPG at SDLT1. Because a higher proportion of filterers may signify greater reliance upon phytoplankton as a food source within the benthic invertebrate community, these results were consistent with greater phytoplankton abundance (as indicated by chlorophyll a concentrations) at SDLT1 in 2016, and potentially indicated a slight enrichment influence at SDLT1 due to elevated nitrate concentrations. The occurrence of significantly greater relative abundance of HPG burrowers at SDLT1 compared to Unnamed Reference Creek was consistent with influences due to sedimentation, but may have also reflected naturally greater substrate embeddedness at lower SDLT1. Comparisons to baseline indicated significantly higher density at SDLT1 in 2016, which was consistent with a slight mine-related enrichment influence at SDLT1 and similar to findings of the 2015 CREMP. No other differences in benthic endpoints were observed between 2016 and baseline studies, suggesting that any enrichment influences were minor.

At Sheardown Lake Tributary 12 (SDLT12), a significantly higher relative abundance of benthic invertebrate collector-gatherers and burrowers occurred relative to Unnamed Reference Creek in 2016, as well as during the 2015/2016 mine-operational period compared to 2007 baseline data. The temporal changes in benthic invertebrate community composition at SDLT12 are hypothesized to reflect a mine-related reduction in flow and/or increased particle loadings (e.g., through dust and/or erosional deposition) over time. At Sheardown Lake Tributary 9 (SLDT9), the relative abundance of benthic invertebrate HPG burrowers and FFG shredders was significantly higher than at Unnamed Reference Creek in 2016. However, because similar differences in composition were not indicated at SDLT9 between 2016 and baseline studies conducted in 2007 and 2013, the differences in community composition between SDLT9 and Unnamed Reference Creek in 2016 potentially reflected naturally greater amounts of in-stream vegetation at SDLT9. Notably, primary benthic invertebrate community endpoints of density, richness and Simpson's Evenness, as well as the relative abundance of metal-sensitive chironomids, showed no significant, ecologically meaningful, differences at SDLT12 or SDLT9 compared to Unnamed Reference Creek in 2016, nor compared to baseline data. This suggested that benthic invertebrate community differences at these tributaries compared to Unnamed Reference Creek in 2016 and to the baseline studies were subtle.

4.4.2 Sheardown Lake (NW and SE Basins)

At the Sheardown Lake NW and SE basins, aqueous concentrations of aluminum, manganese, molybdenum and/or uranium were elevated compared to the reference lake in both 2015 and 2016, but none of these metals, or any other parameters, were elevated compared to concentrations observed during the baseline period, and none were above WQG or AEMP benchmarks. Similar to findings of the 2015 CREMP, total aluminum and manganese concentrations showed strong positive correlations with turbidity in 2016 that, in turn, suggested that these metals were largely bound to/composed suspended particulate matter and were not likely biologically available. High turbidity in Sheardown Lake is hypothesized to reflect natural sources of suspended particulates originating from Mary River, upstream of the mine. Sediment metal concentrations at littoral stations of the Sheardown Lake basins in 2016 were similar to those at the reference lake and compared to baseline data with the exception of slightly elevated arsenic, manganese and/or molybdenum concentrations at littoral stations, suggesting some mine-related influence on sediment quality of the shallow lake zone in Sheardown Lake. However, sediment metal concentrations at profundal stations of the Sheardown Lake basins in 2016 were similar to the reference lake and baseline data, indicating that mine-related influences on sediment quality were confined to littoral habitats. Notably, no metals were present in sediment of Sheardown Lake at concentrations above SQG or AEMP benchmarks that were not also above these criteria at the reference lake, suggesting the natural occurrence of elevated concentrations of some metals (e.g., iron, manganese) in sediment of lakes in the Mary River Project LSA.

Chlorophyll a concentrations at both of the Sheardown Lake basins were significantly higher than at the reference lake in 2016 suggesting greater primary production within the Sheardown Lake system. However, chlorophyll a concentrations within the Sheardown Lake basins remained well below the AEMP benchmark during all seasonal sampling events in 2016, and were consistent with oligotrophic conditions typical of Arctic waterbodies. No significant differences in annual average chlorophyll a concentrations were indicated among the mine construction (2014) and operational (2015, 2016) periods, suggesting no changes in the trophic status of either Sheardown Lake basin since mine operations commenced at the Mary River Project. Benthic invertebrate community data collected at littoral habitat of the Sheardown Lake basins in 2016 indicated no adverse significant differences in primary endpoints (density, richness and Simpson’s Evenness) compared to the reference lake. Although significant differences in relative abundance of dominant invertebrate groups, FFG and HPG were observed between the Sheardown Lake basins and the reference lake in 2016, these differences appeared to reflect naturally differing sediment TOC and/or particle size between the mine-exposed and reference lakes. No consistent types and/or direction of differences in benthic invertebrate community endpoints were observed between 2016 and 2007/2013 baseline data for littoral stations of either Sheardown Lake basin, suggesting no adverse influences to benthic invertebrates associated with the Mary River Project mine operations.

Analysis of Arctic charr populations at the Sheardown Lake basins suggested greater fish abundance compared to the reference lake in 2016, but similar numbers of Arctic charr in 2016 compared to Sheardown Lake baseline studies. Arctic charr captured at nearshore habitat of the Sheardown Lake basins were significantly larger and grew significantly faster, but exhibited similar condition, than those captured at the reference lake in 2016. Arctic charr captured at nearshore habitat of Sheardown Lake NW in 2016 exhibited significantly lower condition than those captured during the baseline period. However, no significant, ecologically meaningful differences in growth and significantly greater condition was indicated for Arctic charr captured at littoral/profundal habitat in 2016 compared to the baseline period. The differential responses in Arctic charr endpoints between Sheardown Lake and the reference lake in 2016, and between Arctic charr collected at nearshore and littoral/profundal habitats for Sheardown Lake studies in 2016 compared to baseline, were not consistent with an adverse mine-related effect on Arctic charr populations at Sheardown Lake. Collectively, the chlorophyll a, benthic invertebrate community and Arctic charr fish population data all suggested no adverse mine-related influences to the biota of Sheardown Lake in the second year of mine operation at the Mary River Project.

5.0 MARY RIVER AND MARY LAKE SYSTEM

5.1 Mary River

5.1.1 Water Quality

Dissolved oxygen (DO) concentrations at Mary River stations were consistently at or above saturation during all spring, summer and fall monitoring events, and were comparable to DO saturation levels observed among the GO-09 series reference river stations for each respective seasonal sampling event (Figure 5.1; Appendix Tables C.1 - C.3). Although DO saturation levels differed significantly among the Mary River benthic study areas, no gradient in DO saturation levels was shown from upstream to downstream of the mine at the time of biological sampling in August 2016 and DO saturation was consistently well above the WQG minimum limit for cold-water biota (i.e., 54%) at all times (Figure 5.1; Appendix Figure C.19 and Table C.50). This suggested that slight differences in DO concentrations/saturation among Mary River study areas were not ecologically meaningful and were unrelated to potential mine influences.

In-situ pH at all Mary River stations was similar to pH at the GO-09 series river reference stations for each respective seasonal sampling event (Appendix Table C.1 – C.3 and Figure C.19). Although pH at Mary River Station CO-05, well downstream of the mine, was significantly lower than at all other Mary River study areas, including the GO-09 river reference area, during the 2016 fall sampling event, pH at all Mary River stations was consistently within WQG limits during all spring, summer and fall sampling events (Figure 5.1; Appendix Table C.50). Aqueous conductivity at Mary River stations showed no distinct spatial changes with progression from upstream to downstream of the mine during the spring, summer or fall sampling events, suggesting no mine-related influences on Mary River conductivity (Appendix Figure C.19). Notably, conductivity varied considerably among spring, summer and fall at all stations, reflecting natural seasonal differences in conductivity of surface runoff related to dilution sources (e.g., spring snowmelt). Similar to comparisons of pH, conductivity differed significantly among Mary River benthic study areas during fall biological monitoring in 2016. However, the incremental differences in conductivity among reference and mine-exposed areas of the Mary River were small and unlikely to be ecologically meaningful. Moreover, rather than being indicative of potential mine-related influences, the differences in conductivity among Mary River study areas likely reflected the natural proportion of flow contributed by various tributaries to the river, as well as differences in the geology of base material between Mary River and these tributaries.

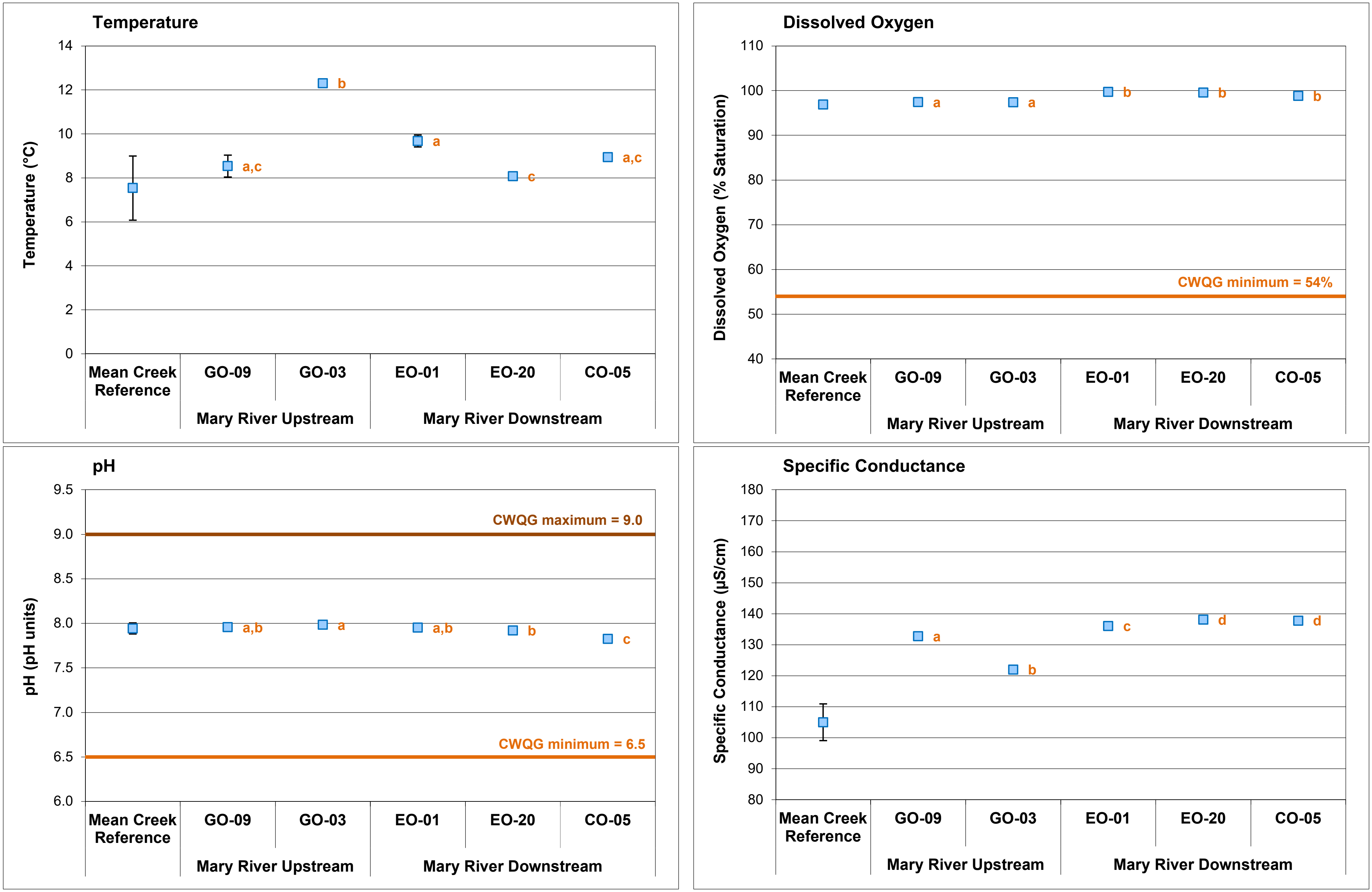

Figure 5.1: Comparison of *in-situ* water quality variables (mean ± SE) measured at the Mary River benthic invertebrate community stations (n = 5) and lotic reference stations (n = 4), Mary River Project CREMP, August 2016. The same letters next to Mary River study area data points indicate no significant difference between study areas.

Water chemistry within Mary River showed no distinct and/or consistent spatial differences with progression downstream from the GO-09 series river reference stations during any of the winter, summer or fall sampling events in 2016 (Table 5.1; Appendix Table C.51). In general, parameter concentrations at Mary River stations located adjacent to or downstream of the mine (EO and CO series stations) were similar to, and often lower than, concentrations observed at the upstream river reference stations (GO-09 series stations) during each respective spring and summer sampling event, as well as at EO series stations during the fall sampling event (Table 5.1; Appendix Table C.51). Total concentrations of several metals, including phosphorus, aluminum, chromium, iron and lead, were slightly elevated (i.e., 3- to 5-fold) at CO stations located immediately downstream of the mine compared to the GO-09 reference stations during the fall monitoring event (Table 5.1). Relatively high total concentrations of these metals at the Mary River CO stations appeared to be associated with elevated turbidity at the time of the fall sampling event (Table 5.1). Despite elevation of total concentrations of these metals, dissolved metal concentrations were consistently similar among Mary River reference and mine-exposed stations for each of the spring, summer and fall sampling events (Appendix Table C.52).

Total aluminum concentrations were above WQG and AEMP benchmarks at all Mary River mine-exposed stations during the summer and fall monitoring events, and total iron concentrations were also above WQG and/or AEMP benchmarks at all Mary River mine-exposed stations during the fall monitoring event, in 2016 (Table 5.1; Appendix Table C.51). However, concentrations of both of these metals were elevated above applicable WQG at one or more of the Mary River GO series reference stations during the spring, summer and fall monitoring events, suggesting naturally high concentrations of aluminum and iron in the Mary River system. Total phosphorus, copper and lead concentrations were also above WQG and/or AEMP benchmarks at one or more Mary River CO stations during fall monitoring in 2016 which, as discussed above, appeared to be associated with elevated turbidity at the time of sampling (Appendix Table C.51). Notably, a very high proportion (i.e., ≥80%) of aluminum, iron, lead and other metals (e.g., manganese, silicon) were in the ‘total’ concentration form, suggesting that these metals were largely associated with suspended particulate matter and were unlikely to be bioavailable. High turbidity was observed at reference (i.e., GO series) stations indicating that elevated turbidity in the Mary River was a natural phenomenon unrelated to the Mary River Project operations. Dissolved metal concentrations at all Mary River stations were well below WQG and AEMP benchmarks.

Temporal evaluation of Mary River water chemistry data suggested higher total concentrations of several metals, including aluminum, copper, iron, lead, manganese and nickel, at one or

Table 5.1: Water chemistry at Mary River monitoring stations, Mary River Project CREMP, August 2016.

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Reference Creek Average (n = 4)	Mary River Reference Station			Mary River Upstream		Tributary	Mary River Downstream of Mine					
						G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05
					Fall 2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	125	191	189	188	169	174	261	186	174	173	172	170	171
	pH (lab)	pH	6.5 - 9.0	-	7.99	8.23	8.24	8.21	8.14	8.14	8.28	8.14	8.12	8.16	8.17	8.13	8.15
	Hardness (as $CaCO_3$)	mg/L	-	-	58	80	84	82	76	79	131	84	80	79	80	79	79
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	5.4	2.9	2.9	2.95	2.5	3.0	2.9	<2.0	3.5	3.4	5.6	6.9
	Total Dissolved Solids (TDS)	mg/L	-	-	65	107	98	98	95	69	141	102	90	90	86	94	99
	Turbidity	NTU	-	-	1.1	16.3	9.7	11.0	12.3	16.1	11.0	16.5	12.9	14.6	16.0	32.7	41.5
	Alkalinity (as $CaCO_3$)	mg/L	-	-	57	73	79	79	74	75	118	82	70	72	68	76	76
Nutrients and Organics	Total Ammonia	mg/L	variable	0.855	<0.020	0.032	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.039	0.026	0.065	0.022
	Nitrate	mg/L	13	13	0.021	0.023	<0.020	<0.020	<0.020	<0.020	0.096	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	0.15	<0.15	0.16	0.25	<0.15	0.15	0.21	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.3	1.2	1.3	1.1	1.3	1.3	1.2	1.2	1.2	1.2	1.8	1.6	1.9
	Total Organic Carbon	mg/L	-	-	1.5	1.5	1.4	1.4	1.5	1.5	1.4	2.3	1.3	1.4	1.5	1.6	1.8
	Total Phosphorus	mg/L	0.020[α]	-	0.0059	0.0125	0.0090	0.0107	0.0089	0.0098	0.0112	0.0117	0.0097	0.0097	0.0157	0.0358	0.0206
	Phenols	mg/L	0.004[α]	-	0.0055	0.0056	0.0063	0.0086	0.0048	0.0037	0.0057	0.0058	0.0039	0.0042	0.0160	0.0552	0.0039
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.5	11.5	9.0	9.3	7.0	6.9	5.6	6.7	6.6	6.6	6.1	6.1	6.1
	Sulphate (SO_4)	mg/L	218[β]	218	4.4	5.6	4.5	4.6	3.8	4.6	14.3	5.0	4.4	4.4	4.2	5.0	5.2
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.058	0.395	0.217	0.258	0.291	0.484	0.251	0.418	0.301	0.382	0.431	***1.040***	***1.390***
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	0.00013	<0.00010	<0.00010	0.00011	0.00013	0.00015	0.00014	0.00012	0.00012	0.00014	0.00020	0.00026
	Barium (Ba)	mg/L	-	-	0.0078	0.0147	0.0130	0.0131	0.0126	0.0142	0.0148	0.0143	0.0133	0.0133	0.0143	0.0174	0.0196
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00040	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	mg/L	-	-	<0.0003875	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	<0.000010	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	12.3	17.0	17.8	18.0	15.7	16.9	27.0	17.5	17.1	16.7	16.9	16.5	16.5
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	0.00096	0.00060	0.00065	0.00073	0.00110	0.00108	0.00112	0.00076	0.00096	0.00108	0.00237	0.00319
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	0.00020	0.00012	0.00014	0.00015	0.00023	0.00024	0.00022	0.00016	0.00018	0.00022	0.00048	0.00065
	Copper (Cu)	mg/L	0.002	0.0024	0.0010	0.0017	0.0017	0.0015	0.00150	0.0016	0.0019	0.0016	0.0016	0.0015	0.0016	0.0024	***0.0027***
	Iron (Fe)	mg/L	0.30	0.874	0.051	0.410	0.227	0.278	0.298	0.471	0.325	0.437	0.308	0.383	0.442	***1.07***	***1.42***
	Lead (Pb)	mg/L	0.001	0.001	0.000096	0.00036	0.00025	0.00024	0.00029	0.00041	0.00042	0.00040	0.00031	0.00034	0.00039	0.00083	***0.00108***
	Lithium (Li)	mg/L	-	-	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	0.0017	0.0024
	Magnesium (Mg)	mg/L	-	-	6.77	9.32	9.46	9.21	8.86	9.18	15.9	10.2	9.58	9.18	9.40	9.66	9.72
	Manganese (Mn)	mg/L	0.935[β]	-	0.00086	0.00562	0.00297	0.00359	0.00365	0.00547	0.00498	0.00531	0.00400	0.00471	0.00541	0.0121	0.0167
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000380	0.000628	0.000510	0.000529	0.000426	0.000457	0.000337	0.000425	0.000515	0.000532	0.000534	0.000533	0.000566
	Nickel (Ni)	mg/L	0.025	0.025	0.00056	0.00079	0.00067	0.00059	0.00073	0.00102	0.00148	0.00111	0.00092	0.00103	0.00117	0.00241	0.00259
	Potassium (K)	mg/L	-	-	0.84	1.68	1.45	1.45	1.34	1.42	1.46	1.44	1.43	1.41	1.40	1.70	1.88
	Selenium (Se)	mg/L	0.001	-	<0.0007625	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.95	1.55	1.27	1.34	1.33	1.73	1.25	1.56	1.35	1.50	1.66	2.74	3.62
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000020	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)	mg/L	-	-	1.830	5.67	4.57	4.56	3.71	3.69	2.20	3.54	3.59	3.46	3.35	3.42	3.40
	Strontium (Sr)	mg/L	-	-	0.01240	0.0234	0.0211	0.0216	0.0179	0.0184	0.0197	0.0188	0.0184	0.0182	0.0179	0.0187	0.0188
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.0000775	0.000014	0.000011	0.000012	0.0000105	0.000014	0.000013	0.000015	0.000011	0.000014	0.000015	0.000027	0.000036
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00799	0.0233	0.0124	0.0156	0.01615	0.0271	0.0156	0.0245	0.0164	0.0212	0.0248	0.0611	0.0822
	Uranium (U)	mg/L	0.015	-	0.00366	0.00657	0.00577	0.00580	0.004605	0.00468	0.00353	0.00430	0.00453	0.00441	0.00406	0.00406	0.00407
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.000875	0.00099	0.00063	0.00074	0.000735	0.00104	0.00078	0.00101	0.00075	0.00092	0.00098	0.00208	0.00274
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0031	0.0050

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Mary River.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

more Mary River mine-exposed stations in 2016 compared to mine baseline period (2005-2013; Figure 5.2; Appendix Figure C.20). However, as in 2015, higher total concentrations of these metals in 2016 almost certainly reflected much greater amounts of suspended matter during the fall sampling event than during the baseline period (e.g., on average, Mary River turbidity was 4.6 times higher in 2016 than during the baseline sampling in fall; Appendix Figure C.20). Turbidity of the Mary River was generally similar among reference and mine-exposed stations, suggesting naturally high suspended matter in the river that were unrelated to mine activity (Appendix Figure C.20). Comparisons of more conservative parameters commonly used as indicators of anthropogenic influences in aquatic environments (e.g., chloride, conductivity, nitrate, sulphate, hardness) indicated no substantial changes in concentrations between 2016 and the baseline period at the Mary River mine-exposed stations during fall sampling events (Figure 5.2; Appendix Figure C.20). In addition, no substantial changes in concentrations of any parameters were observed between 2016 and the mine baseline period for sampling conducted during spring and summer at the Mary River mine-exposed stations. Overall, these results suggested that mine-related influences to water quality of the Mary River, if any, were minor in 2016 based on comparisons to reference conditions and to mine baseline data.

5.1.2 Phytoplankton

Mary River chlorophyll a concentrations at stations downstream of the mine were generally within the range of the GO series river reference stations and/or stream reference stations during the 2016 spring, summer and fall sampling events (Figure 5.3). No significant differences in annual average chlorophyll a concentrations were indicated among the ten Mary River monitoring stations in 2016 (Appendix Table E.13). Chlorophyll a concentrations were well below the AEMP benchmark of 3.7 µg/L during all winter, summer and fall sampling events in 2016 at all Mary River sampling stations, and were suggestive of low (i.e., oligotrophic) phytoplankton productivity based on Dodds et al (1998) trophic status classification for stream environments (Figure 5.3). These results suggested no adverse mine-related influences on phytoplankton density at Mary River in 2016. Low to moderate phytoplankton productivity was predicted for the Mary River given ‘oligotrophic’ to ‘mesotrophic’ CWQG categorization derived from evaluation of total phosphorus concentrations of up to 36 µg/L in 2016 (Table 5.1; Appendix Table C.51). Notably, total phosphorus concentrations were not significantly correlated with chlorophyll a concentrations, and strong correlations between turbidity and total phosphorus suggested that phosphorus was bound to suspended particulates. As such, the availability of phosphorus for phytoplankton productivity at Mary River stations may be more

Figure 5.2: Temporal comparison of water chemistry at Mary River stations for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during fall. Values represent mean ± SD. Creek reference includes CLT-REF and MRY-REF series stations (mean ± SD; n = 4). Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.2 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to Mary River.

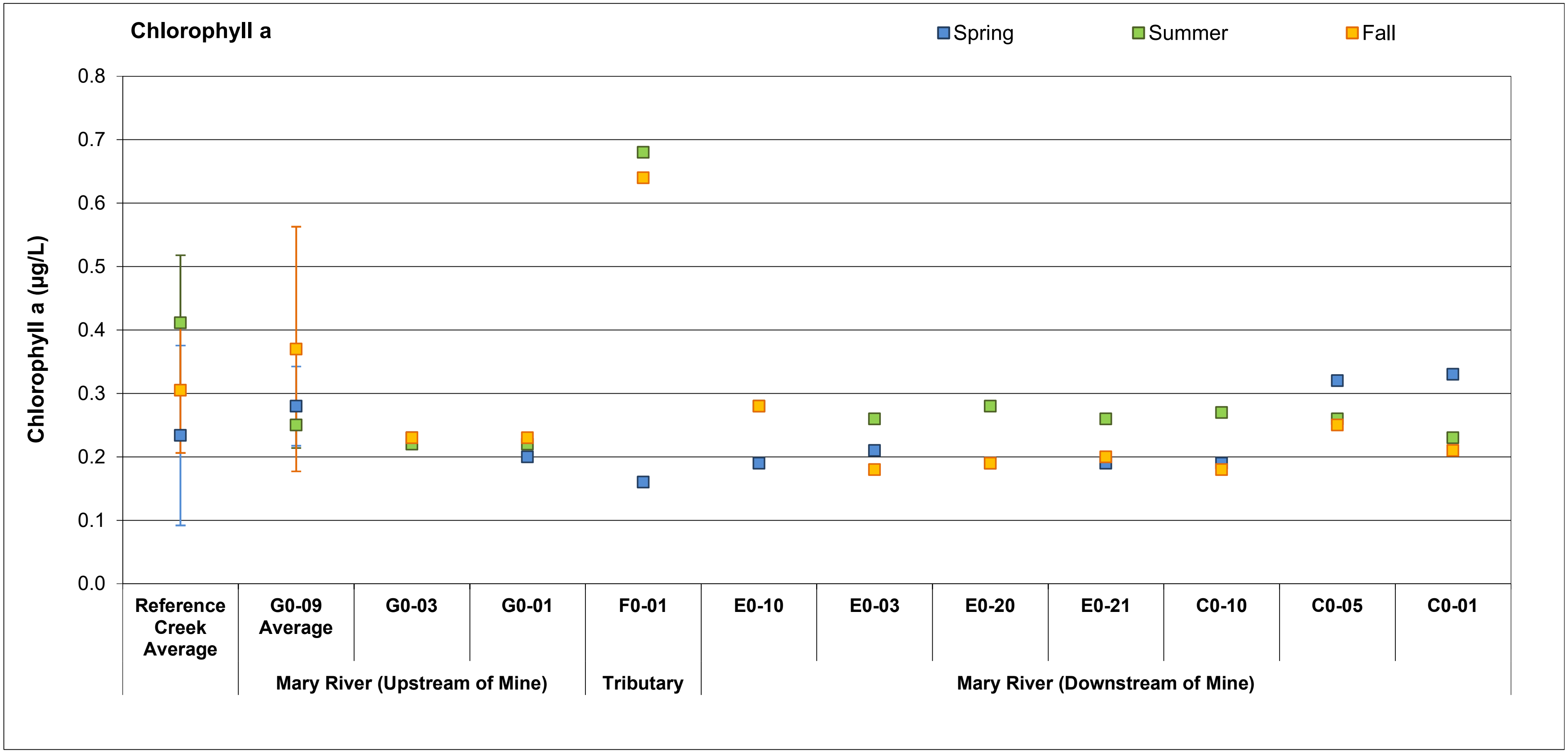

Figure 5.3: Chlorophyll a concentrations at Mary River phytoplankton monitoring stations located upstream and downstream of the mine, Mary River Project CREMP, 2016. Creek reference includes the CLT-REF and MRY-REF series stations (mean ± SD; n = 4).

limited than that suggested by the trophic categorization for the watercourse based on CWQG definitions.

Temporal comparisons of the Mary River chlorophyll a data suggested that concentrations were generally lower at stations downstream of the mine sewage treatment plant outfall (i.e., Station EO-21, -20 and CO series stations) in 2015 and 2016 compared to the baseline period (Figure 5.4). Notably, baseline period chlorophyll a concentrations at these stations were considerably higher than at reference and mine-exposed stations located upstream (Figure 5.4). Chlorophyll a concentrations at EO and CO stations located downstream of the mine sewage treatment plant outfall in 2015/2016 were comparable to concentrations at reference stations (GO) and EO stations located upstream of the mine sewage treatment plant discharge (i.e., Stations EO-10 and -03) during the baseline period (Figure 5.4). Similar to the water chemistry data for Mary River CREMP stations, variability in chlorophyll a concentrations at the Mary River stations among mine periods may have reflected natural differences in turbidity affecting the amount of light energy available to phytoplankton as opposed to adverse response to metals, nutrient enrichment or other potential mine-related influences on phytoplankton productivity. Accordingly, lower chlorophyll a concentrations in 2015 and 2016 at Mary River stations downstream of the mine sewage treatment plant discharge may have been due to naturally higher turbidity (i.e., originating from sources upstream of the mine) rather than an adverse response to mine operations.

5.1.3 Benthic Invertebrate Community

The Mary River benthic invertebrate community assessment included a spatial statistical analysis of key benthic endpoints among upstream reference areas (GO-09, GO-03), near-field mine-exposed areas located adjacent to the mine (EO-01, EO-20) and a far-field, cumulative effects mine-exposed area located downstream of the mine (CO-05; see Table 2.6, Figure 2.4). Benthic invertebrate density did not differ significantly at the three mine-exposed Mary River study areas from the GO-09 reference area in 2016 (Figure 5.5; Appendix Table F.37). Among Mary River mine-exposed areas, richness differed significantly from reference conditions only at the lower CO-05 (cumulative effects) study area. However, the occurrence of significantly higher richness downstream of the mine at CO-05 was not consistent with an adverse mine-related influence (Figure 5.5). Simpson's Evenness at Mary River mine-exposed areas EO-20 and CO-05 was significantly lower than at the GO-09 reference area in 2016 (Figure 5.5; Appendix Table F.37). Lower Simpson's Evenness at these two mine-exposed areas reflected dominance of the benthic invertebrate community by relatively few taxa, of which *Tokungaia* midges were the most numerous (Appendix Table F.35).

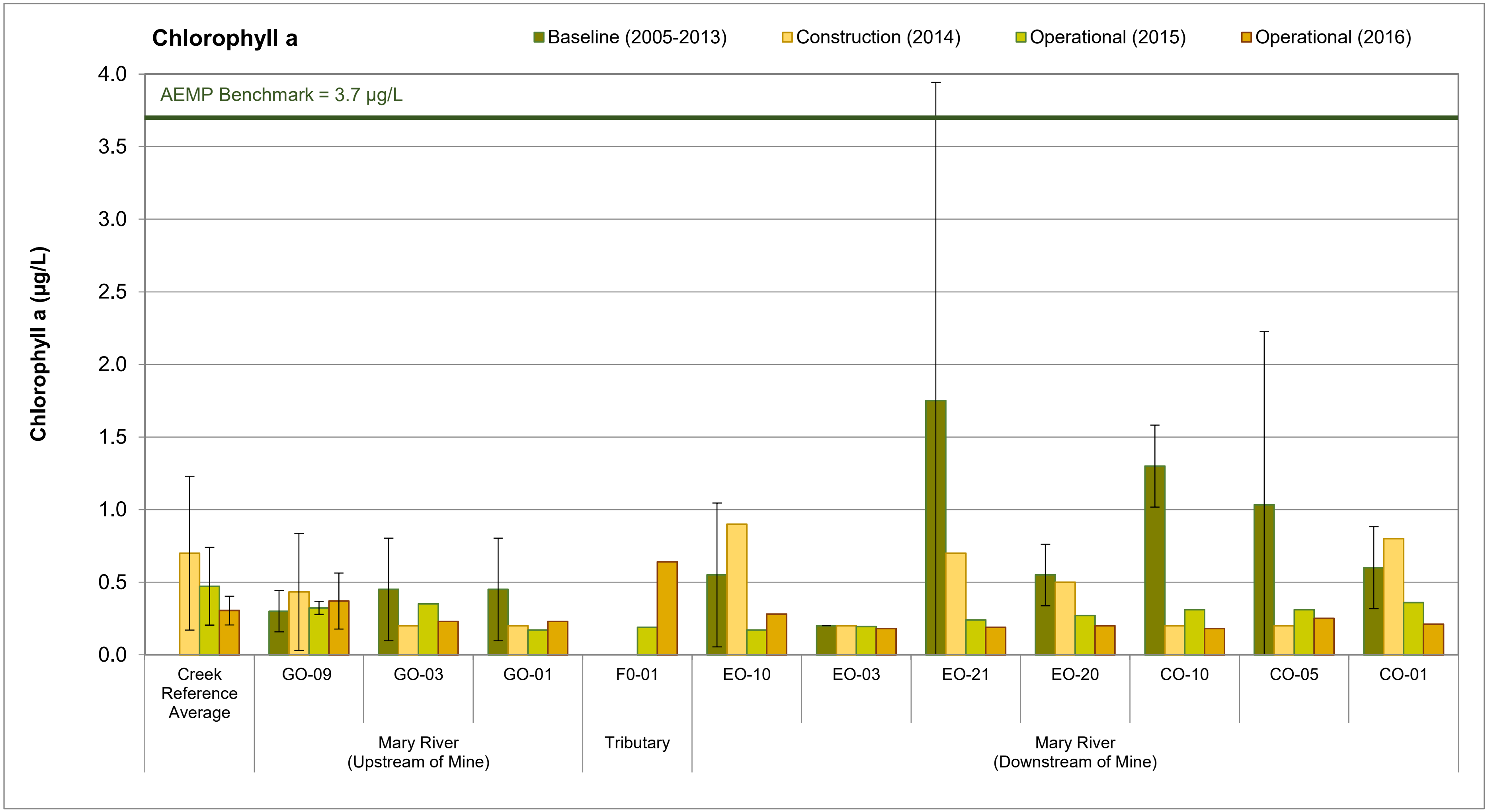

Figure 5.4: Temporal comparison of chlorophyll a concentrations at Mary River stations for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during the fall, Mary River Project CREMP. The creek reference stations include the CLT-REF and MRY-REF series (mean ± SD; n = 4).

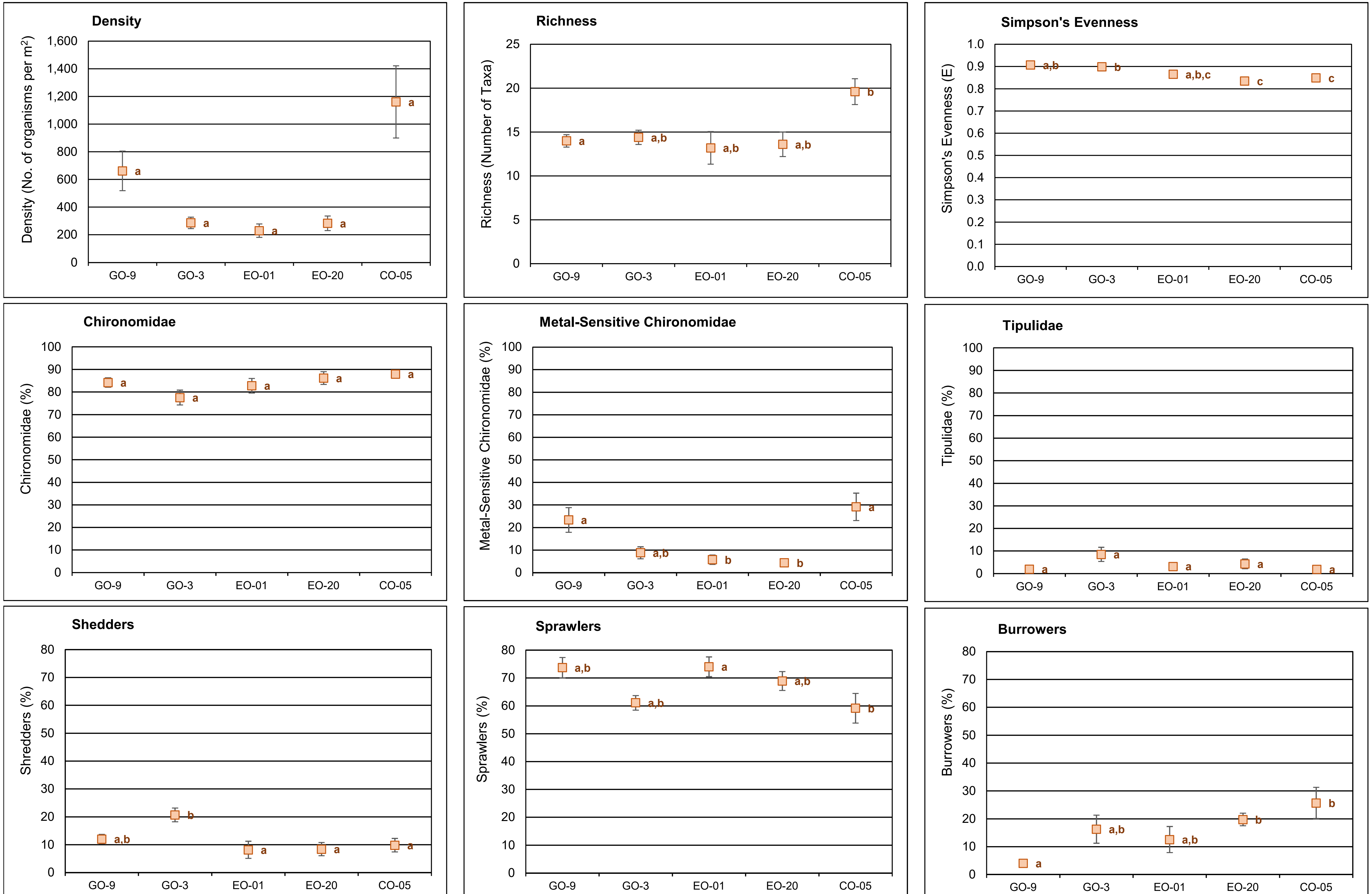

Figure 5.5: Comparison of benthic invertebrate community metrics among Mary River areas (mean ± SE), Mary River Project CREMP, August 2016. The same letters next to data points indicates no significant difference between/among study areas.

Some differences in benthic invertebrate community composition were suggested between the mine-exposed and reference areas of Mary River based on significant differences in Bray-Curtis Index (Figure 5.5; Appendix Table F.37). However, the relative abundance of dominant invertebrate groups did not differ significantly among the Mary River mine-exposed and reference areas (Figure 5.5). Despite the occurrence of significantly lower relative abundance of metal-sensitive chironomids at near-field mine-exposed areas EO-01 and EO-20 compared to the reference area, the magnitude of these differences was within a CES_{BIC} of ± 2 SD_{REF} (Figure 5.5; Appendix Table F.37). This suggested that lower relative abundance of metal-sensitive chironomids at the Mary River near-field mine-exposed areas compared to the reference area was not ecologically meaningful. No significant, ecologically meaningful, differences in the relative abundance of major FFG were shown among the Mary River study areas (Figure 5.5), suggesting no mine-related influences on food resources available for benthic invertebrates in the Mary River. A significantly higher relative abundance of HPG burrowers at Mary River mine-exposed areas EO-20 and CO-05 compared to the GO-09 reference area (Appendix Table F.37) suggested that natural differences in habitat accounted for the differences in Bray-Curtis Index between the mine-exposed and reference areas. Substrate embeddedness was significantly higher at mine-exposed CO-05 than at the reference area, which could partially explain mine-exposed and reference area differences in Bray-Curtis Index (Appendix Table F.34). Higher substrate embeddedness potentially contributed to relatively high abundance of *Tokungaia* midges at the EO-20 and CO-05 mine-exposed areas given that this genus of midges prefers more stable, depositional zones of cold water lotic environments (Oliver and Dillon 1997; Lods-Crozet et al 2012). Therefore, the differences in benthic invertebrate community composition between mine-exposed and reference areas of the Mary River suggested by significantly differing Bray Curtis Index likely reflected natural habitat factors such as substrate embeddedness.

Temporal comparison of the Mary River benthic invertebrate community data indicated no consistent significant differences in density or richness between mine operational (2015, 2016) and baseline (2006 – 2011 data) periods at any of the mine-exposed study areas (i.e., EO-01, EO-20 or CO-05; Figure 5.6; Appendix Tables F.40 – F.42). Simpson's Evenness and chironomid relative abundance was generally significantly higher and lower, respectively, at the mine-exposed areas at the time of mine operational studies compared to the mine baseline studies. However, the same type and direction of significant differences were observed at Mary River areas located upstream of the mine (Appendix Tables F.38 – F.42), suggesting that the differences in these metrics at all Mary River areas over time reflected natural temporal variability and/or represented sampling artifacts of the CREMP (e.g., changes in sampling location, personnel). Although the relative abundance of FFG collector-gatherers was

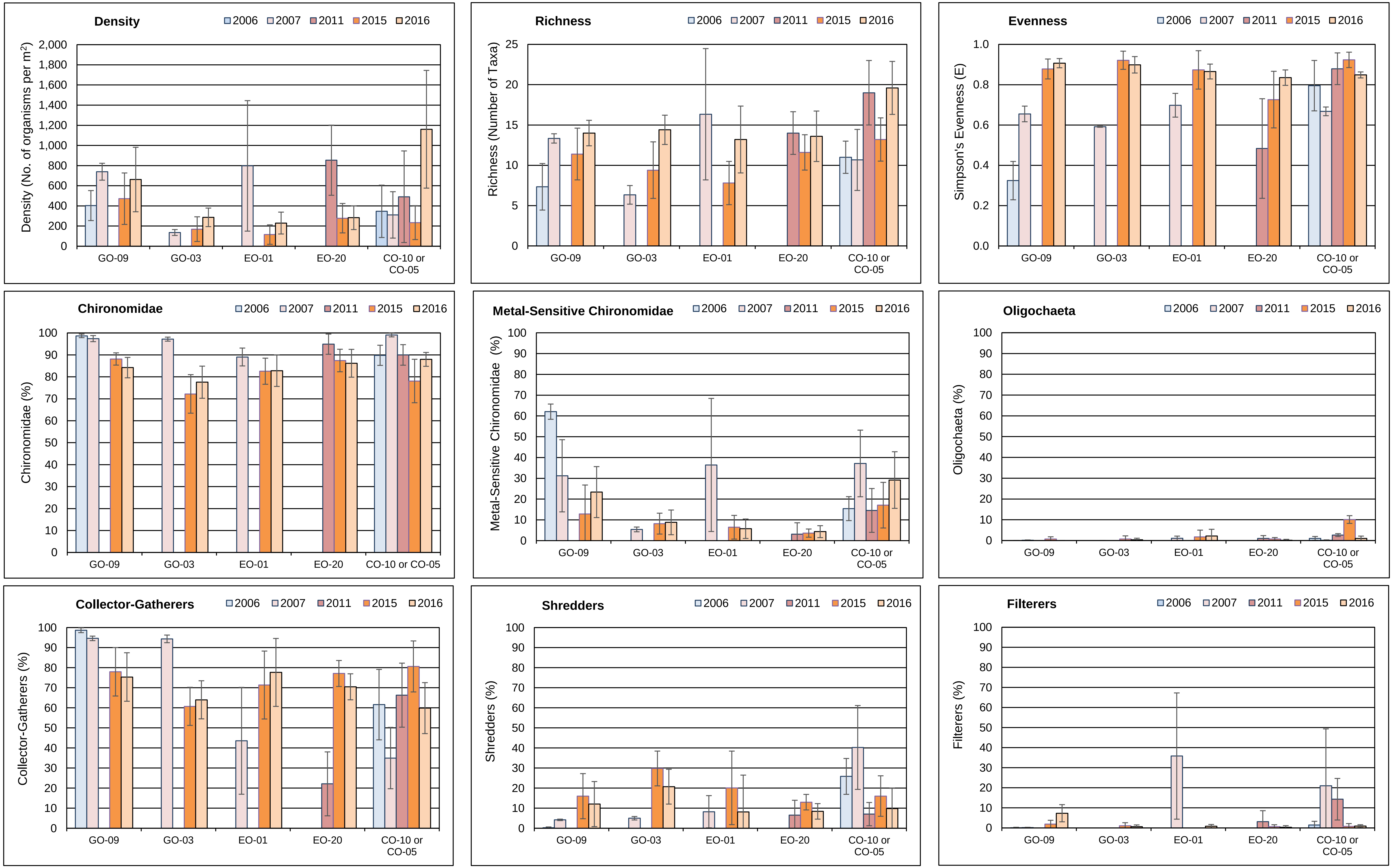

Figure 5.6: Comparison of benthic invertebrate community metrics (mean ± SD) at Mary River stations among baseline (2006, 2007), construction (2014) and operational (2015, 2016) years, Mary River Project CREMP.

significantly higher at upper mine-exposed area EO-20 following initiation of mine-operation than during the baseline period, the proportion of collector-gatherers at this area became more similar to the reference condition in the mine operational period, suggesting that the temporal changes were not mine-related (Appendix Tables F.38 and F.41). Notably, the types, direction, and magnitude of difference for endpoints that differed significantly between the mine operational and baseline periods at the Mary River mine-exposed areas were similar between the 2015 and 2016 CREMP studies (Figure 5.6), suggesting no cumulative temporal influences on benthic invertebrates of the Mary River since mine operations commenced.

5.2 Mary Lake (BLO)

5.2.1 Water Quality

Water quality profiles conducted at Mary Lake in 2016 showed similar *in-situ* water temperature, dissolved oxygen saturation and pH values, but consistently higher specific conductance, at the north basin compared to the south basin throughout the year (Figures 5.7 and 5.8). Water temperatures typically showed a gradient from surface to bottom during the winter, summer and fall at the Mary Lake north and south basins. However, the temperature profile suggested only weak thermal stratification at the south basin water column during the summer and fall sampling events in 2016, with the greatest change in temperature occurring between lake depths of approximately 10 and 20 m in both seasons (Figures 5.7 and 5.8). Weak to more strongly established thermal stratification occurred at Reference Lake 3 during the summer and fall sampling events, respectively (Figures 5.7 and 5.8). The mean water temperature at the bottom of water column at Mary Lake littoral stations did not differ significantly from that of Reference Lake 3 littoral stations in fall 2016 (Figure 5.9; Appendix Tables C.22 and C.57).

Dissolved oxygen profiles conducted at Mary Lake in 2016 indicated the development of a strong oxycline at the north basin in winter beginning at a depth of approximately 5 m, and a weak oxycline at the south basin in winter, summer and fall at depths greater than approximately 10 m (Figures 5.7 and 5.8). This differed from Reference Lake 3, where no oxycline development was apparent in the summer or fall of 2016. Nevertheless, dissolved oxygen saturation levels at Mary Lake remained above the WQG of 54% through the entire water column at the south basin in all seasons, and at the north basin in summer and fall seasons (Figures 5.7 and 5.8). Dissolved oxygen saturation levels below the WQG of 54% occurred at depths greater than approximately 11.5 m at the Mary Lake north basin in the winter (Figure 5.7). Dissolved oxygen saturation levels at Mary Lake littoral stations were well above the respective WQG at the bottom of the water column, and did not differ significantly

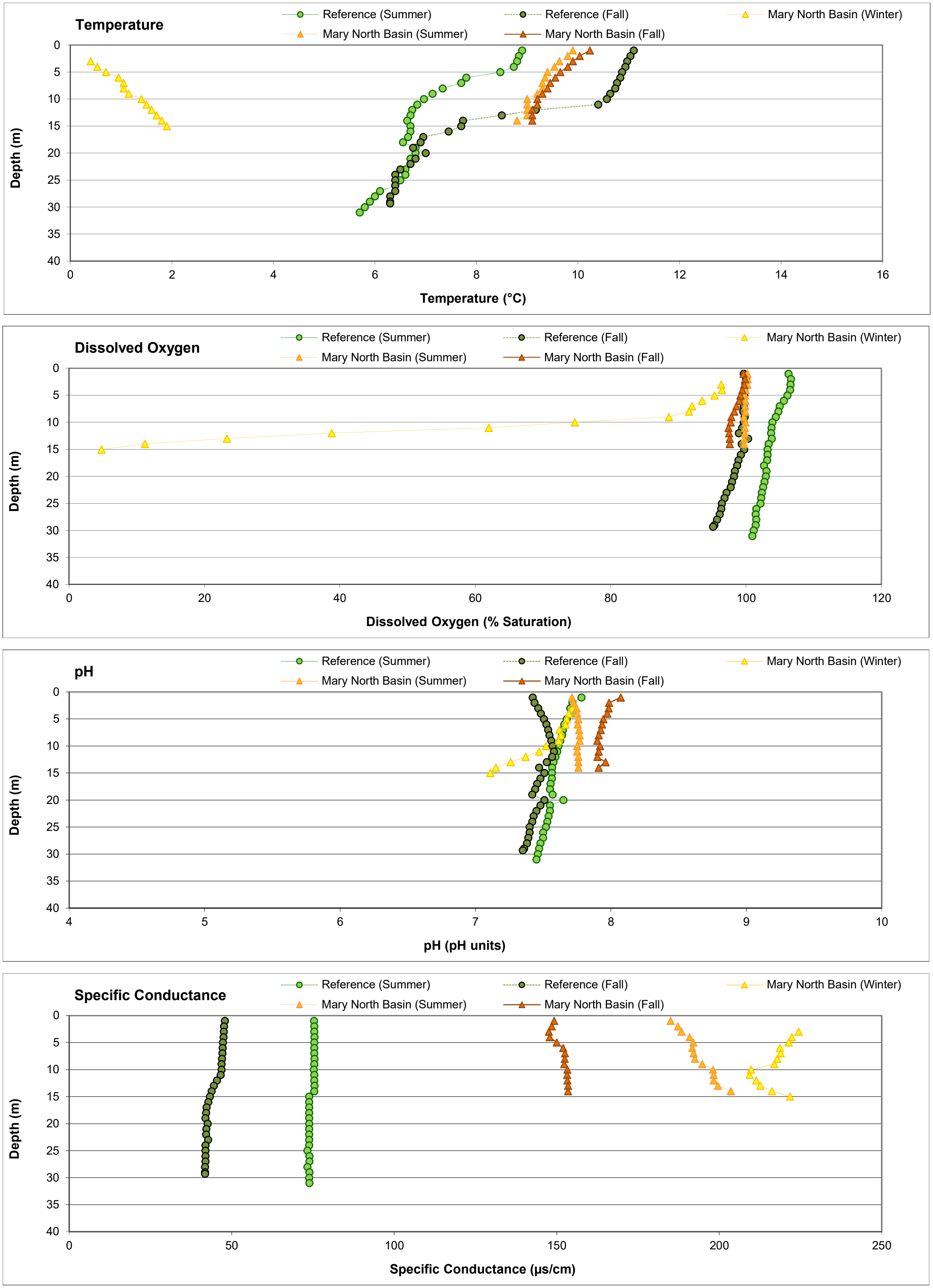

Figure 5.7: Average *in-situ* water quality with depth from surface at the Mary Lake (mine-exposed area) north basin compared to Reference Lake 3 during winter, summer, and fall sampling events, Mary River Project CREMP, 2016.

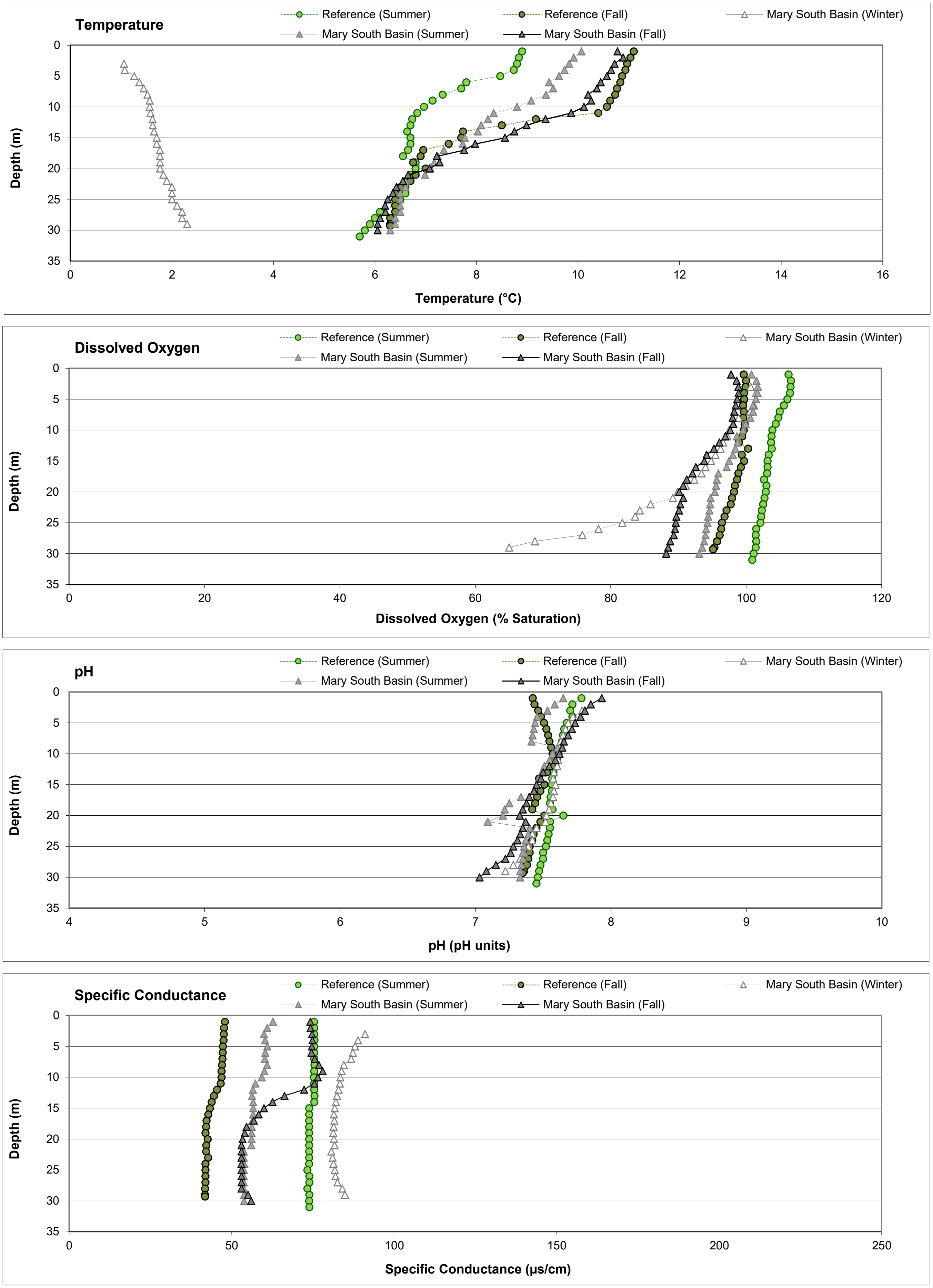

Figure 5.8: Average *in-situ* water quality with depth from surface at the Mary Lake (mine-exposed area) south basin compared to Reference Lake 3 during winter, summer, and fall sampling events, Mary River Project CREMP, 2016.

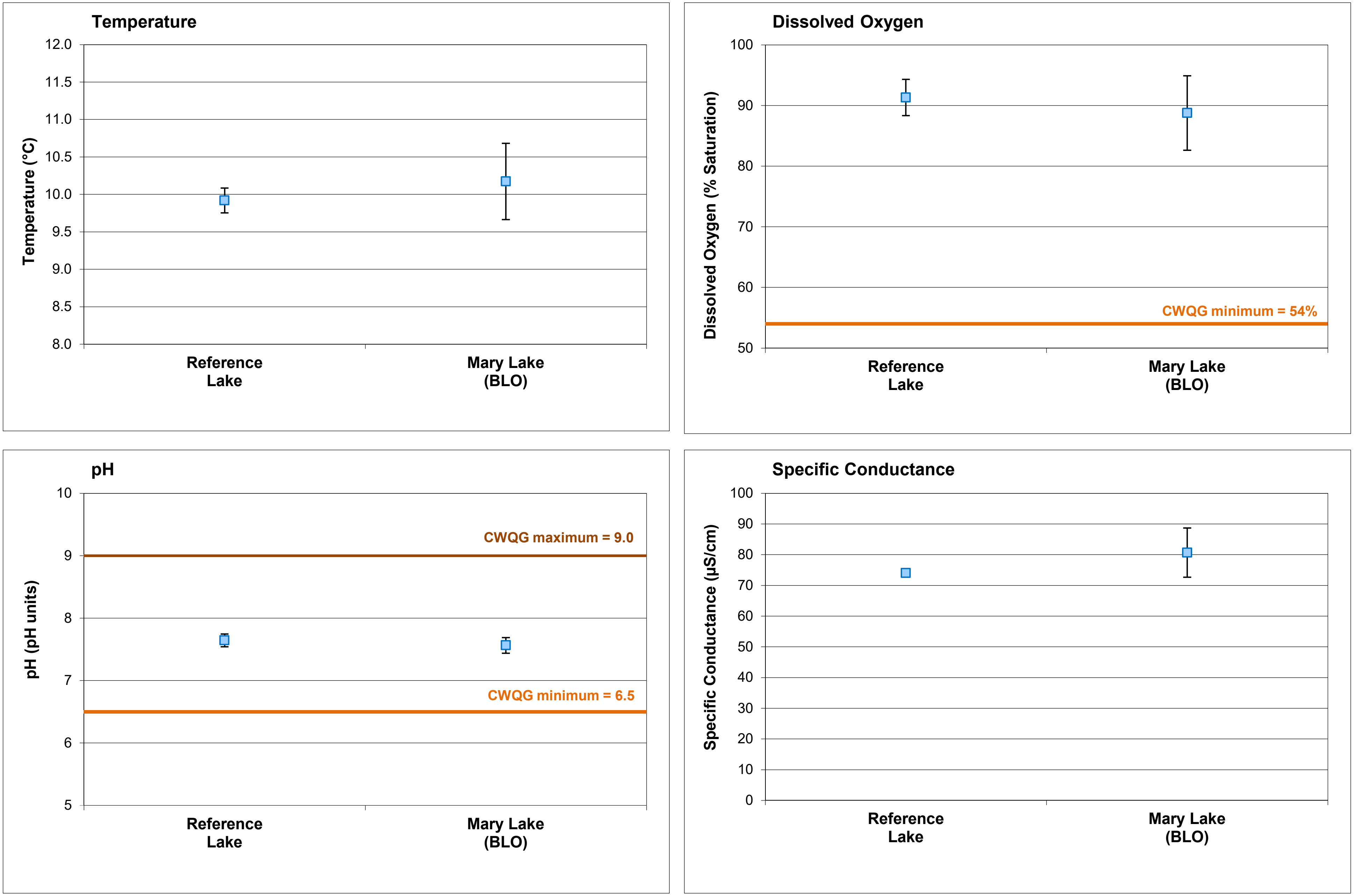

Figure 5.9: Comparison of in-situ water quality variables (mean ± SD; n = 5) measured near the bottom of the water column at Mary Lake (BLO) and Reference Lake 3 (REF3) littoral benthic invertebrate community stations, Mary River Project CREMP, August 2016. An asterisk (*) next to the Mary Lake data point indicates a significant difference compared to the reference lake measure.

from those at Reference Lake 3, during the 2016 fall sampling event (Figure 5.9; Appendix Tables C.22 and C.57).

In-situ profiles of pH showed no substantial change from the surface to bottom of the water column at either the north or south basins of Mary Lake during winter, summer or fall sampling in 2016, and were also comparable to pH profiles at Reference Lake 3 (Figures 5.7 and 5.8). No significant differences in bottom pH were indicated between Mary Lake and Reference Lake 3 at littoral stations sampled in fall 2016 (Figure 5.9; Appendix Table F.57). In addition, pH values at Mary Lake water quality and benthic littoral stations were consistently within WQG limits (Figure 5.9). Specific conductance was substantially higher at the north basin compared to the south basin of Mary Lake (Figures 5.7 and 5.8; Appendix Figure C.25). The differences in specific conductance between lake basins likely reflected natural differences in dominant inflow sources to Mary Lake (i.e., Tom River inflow to the north basin, and the Mary River inflow to the south basin) and natural differences in geochemistry associated with these inflows. Specific conductance of the Mary Lake north basin was higher than at Reference Lake 3, but comparable to that of the reference creek stations. However, specific conductance measured at the water column bottom did not differ significantly between Mary Lake and Reference Lake 3 at littoral stations (Figure 5.9; Appendix Table C.57), reflecting the fact that specific conductance at the south basin of Mary Lake was comparable to that of Reference Lake 3 (Figures 5.7 and 5.8). Only minor changes in specific conductance were observed with depth (i.e., ≤20 μS/cm) during the winter, summer and fall sampling events in 2016 at the Mary Lake north and south basins (Figures 5.7 and 5.8). Water clarity, as determined using Secchi depth readings, was significantly lower at Mary Lake compared to Reference Lake 3 in fall 2016 (Appendix Table C.22 and C.57). In general, Secchi depth readings were similar among the Mary Lake stations, suggesting no spatial differences in water clarity throughout the lake (Appendix Table C.56).

Water chemistry of the Mary Lake north basin showed slightly (i.e., 3- to 5-fold higher) to moderately elevated (i.e., 5- to 10-fold higher) turbidity and concentrations of total aluminum, total manganese and/or total uranium compared to Reference Lake 3 at the time of summer and fall sampling in 2016 (Table 5.2; Appendix Tables C.58 and C.62). However, of these parameters, only manganese was moderately elevated at the Mary Lake north basin compared to respective mean values for the lotic reference stations, and only during the fall sampling event. In addition, no parameters were above WQG and AEMP benchmarks at the Mary Lake north basin during any of the winter, summer or fall monitoring events in 2016 (Table 5.2; Appendix Table C.58). Furthermore, despite continuously higher concentrations since mine construction (2014) and initial mine operation (2015) periods, average concentrations of the

Table 5.2: Water chemistry at Mary Lake north basin (BLO-01) and south basin (BLO) monitoring stations, Mary River Project CREMP, 2016. Values presented are averages of samples taken from the surface and the bottom of the water column at each station. * Copper data confounded by field sampling equipment.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Reference Lake 3 Average (n = 3)	Tom River I0-01	North Basin (Mine-exposed) BL0-01-A	BL0-01	BL0-01-B	South Basin (Mine-exposed) BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
					Fall 2016	19-Aug-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016	24-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	84	194	162	162	158	86	68	80	70	79	65	77
	pH (lab)	pH	6.5 - 9.0	-	7.68	8.24	8.15	8.13	8.16	7.82	7.77	7.71	7.78	7.85	7.72	7.83
	Hardness (as $CaCO_3$)	mg/L	-	-	35	95	79	78	75	40	32	37	33	36	31	36
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	2.25	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	39	98	90	84	81	45	33	40	39	42	31	38
	Turbidity	NTU	-	-	0.3	0.4	1.3	1.2	1.5	1.7	1.6	1.8	0.7	2.4	1.3	2.0
	Alkalinity (as $CaCO_3$)	mg/L	-	-	33	94	78	80	79	38	29	38	33	35	28	34
Nutrients and Organics	Total Ammonia	mg/L	variable	0.855	0.0398	<0.020	0.021	0.057	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.7	1.7	1.8	1.8	1.9	1.2	1.2	1.2	1.3	1.2	1.2	1.2
	Total Organic Carbon	mg/L	-	-	2.8	1.8	2.0	1.8	1.9	1.4	1.3	1.3	1.4	1.5	1.3	1.4
	Total Phosphorus	mg/L	0.020[α]	-	0.010	<0.0030	0.003	0.004	0.003	0.007	0.007	0.010	0.006	0.006	0.008	0.005
	Phenols	mg/L	0.004[α]	-	0.003	0.004	0.003	0.002	0.002	0.011	0.004	0.008	0.003	0.006	0.009	0.008
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.27	5.51	3.47	3.39	3.14	1.91	1.42	1.60	1.29	1.61	1.36	1.50
	Sulphate (SO_4)	mg/L	218[β]	218	4.07	1.95	1.43	1.42	1.35	1.33	0.90	1.12	0.84	1.19	0.81	1.11
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	0.004	0.010	0.026	0.030	0.026	0.078	0.058	0.065	0.023	0.056	0.050	0.059
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	0.00015	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0065	0.0098	0.0079	0.0078	0.0082	0.0056	0.0045	0.0053	0.0038	0.0049	0.0040	0.0048
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.000050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	6.99	18.90	15.55	15.40	15.45	8.24	6.48	7.63	6.68	7.52	6.26	7.26
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00082	0.00099	0.001	0.0011	0.0011	0.00068	0.00064	0.00071	0.00053	*	*	*
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	<0.050	<0.050	<0.050	0.056	0.048	0.052	<0.030	0.050	0.039	0.052
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.00010	<0.00010	<0.00010	0.000067	0.000060	0.000062	<0.000050	0.000067	0.0000555	0.000068
	Lithium (Li)	mg/L	-	-	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	4.3	11.4	8.7	8.7	8.5	4.8	3.8	4.4	4.0	4.4	3.7	4.3
	Manganese (Mn)	mg/L	0.935[β]	-	0.00062	0.00032	0.00507	0.00520	0.00476	0.00158	0.00286	0.00140	0.00115	0.00163	0.00139	0.00155
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.00014	0.00024	0.00022	0.00022	0.00021	0.00016	0.00012	0.00014	0.00009	0.00014	0.00011	0.00013
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	0.00052	0.00054	0.00055	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.89	1.04	0.88	0.88	0.87	0.68	0.57	0.63	0.51	0.63	0.54	0.62
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.42	0.86	0.81	0.81	0.84	0.68	0.57	0.64	0.54	0.63	0.53	0.62
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.84	3.20	2.03	2.00	1.94	1.24	0.96	1.11	0.89	1.09	0.90	1.05
	Strontium (Sr)	mg/L	-	-	0.0081	0.0130	0.0111	0.0111	0.0110	0.0071	0.0054	0.0064	0.0050	0.0063	0.0051	0.0061
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.000010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	0.0009	0.0011	0.0009	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00027	0.00253	0.00163	0.00157	0.00151	0.00085	0.00050	0.00069	0.00043	0.00068	0.00044	0.00063
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Mary Lake.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

majority of parameters at the Mary Lake north basin in 2016 were comparable to, and often lower than, concentrations observed during the mine baseline (2005 – 2013) period (Figure 5.10; Appendix Table C.62 and Figure C.26). This suggested that, similar to Mary River, elevated aluminum, manganese and uranium concentrations at the Mary Lake north basin compared to Reference Lake 3 most likely reflected naturally high turbidity and specifically, particulate-bound metals, as opposed to potential mine-related influences on water chemistry.

Water chemistry at the Mary Lake south basin showed no consistent spatial differences in parameter concentrations with progression from the Mary River inlet to the lake outlet during any of the winter, summer or fall sampling events in 2016 (Table 5.2; Appendix Table C.59), suggesting that the south basin waters were generally well mixed both laterally and vertically. On average, turbidity was moderately elevated (i.e., 5- to 10-fold higher), and aluminum, copper and manganese concentrations moderately to highly elevated (i.e., ≥10-fold higher), at the Mary Lake south basin compared to Reference Lake 3 during the 2016 summer and/or fall sampling events (Table 5.2; Appendix Tables C.59 and C.62). Similar to water chemistry of the Mary River and Sheardown Lake SE water bodies, aluminum, manganese and iron concentrations showed a strong positive correlation with turbidity for the Mary Lake south basin combined data set (i.e., winter, summer and fall data; $r^2 \geq 0.70$), suggesting that much of the aqueous aluminum and manganese was associated with suspended particles (e.g., aluminosilicates). As indicated previously, high turbidity in the Mary River originated from natural sources upstream of the mine and accordingly, relatively high turbidity at Mary Lake was therefore not associated with the mine operations. Despite elevation of these metals at the south basin of Mary Lake relative to Reference Lake 3, concentrations of all parameters were generally well below established WQG and AEMP benchmarks during all 2016 sampling events[13] at the time of the fall sampling event (Table 5.2; Appendix Table C.59).

Temporal comparisons of the Mary Lake south basin water chemistry data suggested no changes in average concentrations of mine-related parameters in 2016 compared to the baseline (2005 – 2013) period except for aluminum and turbidity (Figure 5.10; Appendix Figure C.26). Although higher turbidity and concentrations of aluminum were observed at stations most distant to the Tom and Mary rivers inlets to Mary Lake in 2016 compared to baseline conditions, parameter levels closer to these river inlets (i.e., BLO-01 and BLO-05/-03, respectively) were comparable between 2016 and the baseline period (Figure 5.10; Appendix Figure C.26). Therefore, the source of turbidity and aluminum to the Mary Lake south basin in

[13] Refer to footnote 2 (page 23) and Appendix B regarding phenol concentrations above WQG at the mine-exposed and reference areas of the Mary River Project LSA waterbodies.

Figure 5.10: Temporal comparison of water chemistry at Mary Lake (BLO) for mine baseline (2005 - 2013), construction (2014), and operational (2015, 2016) periods during fall. Values represent mean ± SD. Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.2 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to Mary Lake.

fall 2016 was unclear, but did not appear to be related to discharge from the Tom or Mary rivers. Parameter concentrations at the Mary River south basin in 2016 were similar to those in years of mine construction (2014) and initial mine operation (2015; Figure 5.10; Appendix Figure C.26). The general lack of temporal differences in water quality of the Mary Lake south basin over time provided additional support that elevated aluminum concentrations at the south basin relative to Reference Lake 3 were related to naturally higher turbidity at Mary Lake rather than a mine influence on lake water quality.

5.2.2 Sediment Quality

Surficial sediment of the Mary Lake north basin (BLO-01) was composed of silt loam material with low TOC content (Figure 5.11). At the Mary Lake south basin, sediment of the littoral and profundal stations was characterized by silt loam and silty clay loam material with low TOC content (Figure 5.11). Silt was the predominant particle size among littoral stations of both Mary Lake and Reference Lake 3, with no significant difference in silt content indicated between lakes (Appendix Table D.25). However, sediment sand and TOC content was significantly lower at littoral stations of Mary Lake compared to the reference lake. Substrate containing visible iron (oxy)hydroxide material was not observed at the Mary Lake north or south basins in 2016 (Appendix Tables D.22 – D.24), which contrasted with that of Reference Lake 3 and the other mine-exposed lakes where such material was commonly visible as a thin, distinct layer or floc on or within surficial sediment. Substrate of Mary Lake often contained sub-surface blackening/dark colouration which occasionally occurred as bands/layers indicating the presence of reduced sediment demarcated by distinct redox boundaries in some cases (Appendix Tables D.22 – D.24). Similar sub-surface reducing conditions were observed in sediment of the reference lake, though no distinct redox boundaries were visible (Appendix Tables D.22 – D.24).

Sediment metal concentrations at the Mary Lake north basin were similar to those observed at littoral stations of Reference Lake 3, with only manganese showing slight elevation in concentration at the Mary Lake north basin station (Table 5.3; Appendix Table D.26). Sediment metal concentrations at the Mary Lake south basin showed no spatial gradients with progression from the Mary River inlet to the lake outlet for either the littoral or profundal stations, suggesting that the Mary River was not contributing disproportionate concentrations of metals (Appendix Table D.26). Sediment metal concentrations at the Mary Lake south basin littoral and profundal sediment monitoring stations were comparable to average metal concentrations at like-depth stations of the reference lake (Table 5.3; Appendix Table D.27). Of those metals with established SQG, only manganese was above the applicable guidelines at the north basin littoral station, and on average, at the south basin littoral stations of Mary

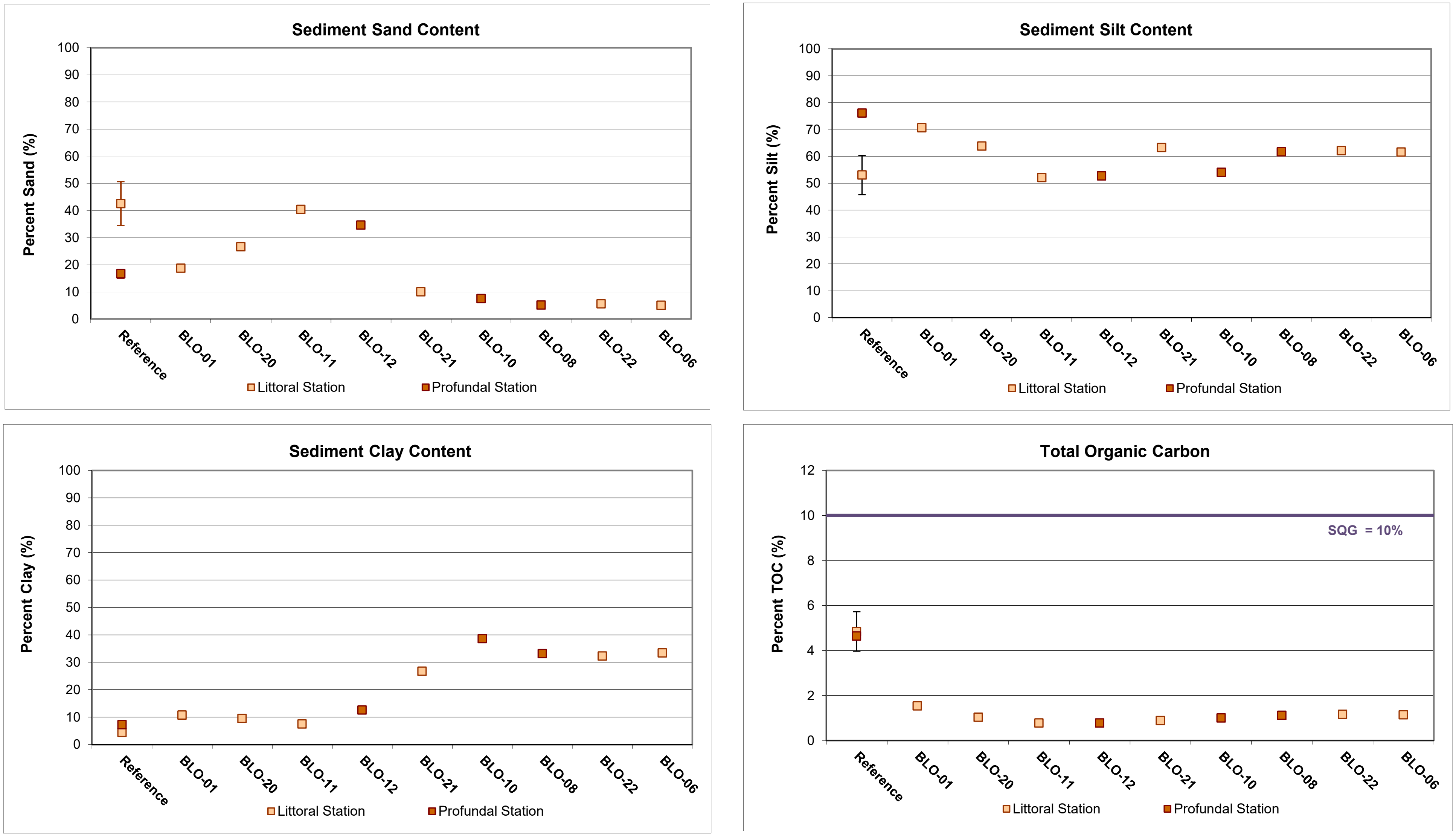

Figure 5.11: Sediment particle size and total organic carbon (TOC) content comparisons among Mary Lake (BLO) north and south basin sediment monitoring stations and to Reference Lake 3 averages (mean ± SE), Mary River Project CREMP, August 2016.

Table 5.3: Sediment particle size, total organic carbon, and metal concentrations at Mary Lake north basin (BLO-01), Mary Lake south basin (BLO), and Reference Lake 3 (REF3) sediment monitoring stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Littoral			Profundal	
					Reference Lake (n = 5)	Mary Lake (North Basin) (n = 1)	Mary Lake (South Basin) (n = 5)	Reference Lake (n = 5)	Mary Lake (South Basin) (n = 3)
					Average ± Std. Error	Average	Average ± Std. Error	Average ± Std. Error	Average ± Std. Error
Non-metals	Sand	%	-	-	42.5 ± 8.1	18.7	17.5 ± 6.3	16.7 ± 1.5	15.7 ± 9.5
	Silt	%	-	-	53.1 ± 7.3	70.6	60.6 ± 2.0	76.1 ± 1.4	56.1 ± 2.8
	Clay	%	-	-	4.4 ± 1.0	10.7	21.9 ± 5.1	7.2 ± 0.4	28.1 ± 7.9
	Moisture	%	-	-	89.7 ± 6.0	55.9	50.0 ± 3.4	83.5 ± 5.4	54.3 ± 7.7
	Total Organic Carbon	%	10^{α}	-	4.85 ± 0.88	1.54	1.00 ± 0.07	4.64 ± 0.13	0.97 ± 0.10
Metals	Aluminum (Al)	mg/kg	-	-	16,480 ± 397	14,700	20,260 ± 2,189	25,150 ± 1,418	21,533 ± 3,481
	Antimony (Sb)	mg/kg	-	-	<0.10 ± 0	<0.10	<0.10 ± 0	0.12 ± 0.02	<0.10 ± 0
	Arsenic (As)	mg/kg	17	5.9	3.71 ± 0.26	5.54	3.37 ± 0.34	***6.47* ± 0.27**	3.49 ± 0.40
	Barium (Ba)	mg/kg	-	-	112 ± 11	87	88 ± 11	162 ± 8	89 ± 16
	Beryllium (Be)	mg/kg	-	-	0.67 ± 0.02	0.76	1.02 ± 0.13	1.02 ± 0.05	1.07 ± 0.19
	Bismuth (Bi)	mg/kg	-	-	<0.20 ± 0	<0.20	0.23 ± 0.01	0.21 ± 0.004	0.24 ± 0.02
	Boron (B)	mg/kg	-	-	13.0 ± 0.9	21.6	27.9 ± 3.2	19.2 ± 1.0	29.5 ± 5.4
	Cadmium (Cd)	mg/kg	3.5	1.5	0.146 ± 0.035	0.100	0.120 ± 0.017	0.180 ± 0.010	0.128 ± 0.023
	Calcium (Ca)	mg/kg	-	-	5,128 ± 470	9,700	5,176 ± 593	6,111 ± 156	4,603 ± 173
	Chromium (Cr)	mg/kg	90	98	55.0 ± 1.2	61.7	76.2 ± 5.3	80.0 ± 4.1	80.7 ± 10.1
	Cobalt (Co)	mg/kg	-	-	10.15 ± 0.57	13.90	14.76 ± 1.32	18.15 ± 0.75	15.33 ± 1.93
	Copper (Cu)	mg/kg	110	50	***66.5* ± 7.4**	27.5	28.5 ± 2.7	***101.4* ± 5.6**	30.0 ± 4.7
	Iron (Fe)	mg/kg	$40,000^{\alpha}$	52,400	29,840 ± 3,488	34,400	35,750 ± 2,763	***53,580* ± 2,174**	36,400 ± 4,339
	Lead (Pb)	mg/kg	91.3	35	***46.0* ± 17.4**	16.3	23.1 ± 3.6	29.5 ± 5.0	24.7 ± 3.7
	Lithium (Li)	mg/kg	-	-	27.3 ± 0.4	29.9	39.2 ± 4.5	41.7 ± 2.1	39.6 ± 6.2
	Magnesium (Mg)	mg/kg	-	-	10,852 ± 274	14,600	14,500 ± 1,000	16,160 ± 814	14,633 ± 1,822
	Manganese (Mn)	mg/kg	$1,100^{\alpha,\beta}$	4,370	496 ± 99	1,790	1,670 ± 845	1,866 ± 449	1,047 ± 158
	Mercury (Hg)	mg/kg	0.486	0.17	0.0355 ± 0.0063	0.0275	0.0403 ± 0.0071	0.0699 ± 0.0019	0.0516 ± 0.0126
	Molybdenum (Mo)	mg/kg	-	-	2.19 ± 0.49	0.58	0.87 ± 0.16	3.27 ± 0.34	0.94 ± 0.11
	Nickel (Ni)	mg/kg	$75^{\alpha,\beta}$	72	38.6 ± 1.6	53.2	55.5 ± 3.2	56.3 ± 2.6	59.9 ± 5.4
	Phosphorus (P)	mg/kg	$2,000^{\alpha}$	1,580	840 ± 47	1,110	881 ± 38	1,121 ± 57	865 ± 51
	Potassium (K)	mg/kg	-	-	3,894 ± 172	3,400	4,921 ± 607	5,891 ± 281	5,210 ± 924
	Selenium (Se)	mg/kg	-	-	0.49 ± 0.06	<0.20	0.21 ± 0.01	0.85 ± 0.06	0.23 ± 0.01
	Silver (Ag)	mg/kg	-	-	0.12 ± 0.01	<0.10	0.12 ± 0.01	0.27 ± 0.01	0.13 ± 0.02
	Sodium (Na)	mg/kg	-	-	296 ± 29	239	310 ± 33	455 ± 24	331 ± 53
	Strontium (Sr)	mg/kg	-	-	11.4 ± 0.5	13.8	13.0 ± 1.0	15.8 ± 0.6	13.5 ± 1.8
	Sulphur (S)	mg/kg	-	-	<5,000 ± 0	<5,000	<5,000 ± 0	<5,000 ± 0	<5,000 ± 0
	Thallium (Tl)	mg/kg	-	-	0.388 ± 0.021	0.331	0.491 ± 0.063	0.801 ± 0.035	0.504 ± 0.088
	Tin (Sn)	mg/kg	-	-	56.3 ± 28.9	4.1	6.9 ± 3.1	16.3 ± 7.8	8.3 ± 1.1
	Titanium (Ti)	mg/kg	-	-	1072 ± 36	965	1414 ± 94	1331 ± 69	1407 ± 159
	Uranium (U)	mg/kg	-	-	11.9 ± 1.52	3.78	7.63 ± 1.00	27.3 ± 1.52	8.58 ± 1.77
	Vanadium (V)	mg/kg	-	-	50.0 ± 1.3	46.8	57.0 ± 5.3	72.0 ± 3.6	58.8 ± 8.3
	Zinc (Zn)	mg/kg	315	135	73.7 ± 2.7	49.8	68.6 ± 7.0	105 ± 5.1	70.0 ± 10.6
	Zirconium (Zr)	mg/kg	-	-	4.3 ± 0.6	9.3	19.4 ± 1.9	4.0 ± 0.2	20.2 ± 3.2

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2015)).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, background sediment quality data, and method detection limits. The indicated values are specific to Mary Lake.

(grey box) Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

Lake in 2016 (Table 5.3; Appendix Table D.26). Although sediment chromium and iron concentrations were above respective SQG at some individual littoral and profundal stations of the Mary Lake south basin, average concentrations of these metals were below the applicable guidelines (Table 5.3; Appendix Table D.26). Notably, concentrations of manganese (and iron) were elevated above SQG in sediment at the reference lake profundal stations, suggesting that concentrations of manganese above guidelines at Mary Lake may reflect natural conditions un-related to mine activity. No metals were observed at concentrations above the sediment AEMP benchmarks at littoral and profundal stations of the Mary Lake north or south basins (Table 5.3; Appendix Table D.26).

Temporal comparisons of the sediment metals data suggested only a slight elevation (i.e., 2- to 5-fold higher) in manganese concentrations at Mary Lake littoral stations, but similar metal concentrations at Mary Lake profundal stations, between 2016 and the baseline period[14] (Figure 5.12; Appendix Table D.27). With the exception of sediment manganese concentrations at littoral stations of Mary Lake, no metals showed progressively higher concentrations from mine baseline, to mine construction, to 2015 and 2016 mine operational years in sediment of Mary Lake littoral or profundal stations (Figure 5.12). Similar to the other mine-exposed lakes, slight variation in station locations and/or data treatment among studies likely contributed to the appearance of higher average manganese concentrations in sediment at the Mary Lake littoral stations in 2015 and 2016 compared to the mine baseline/construction periods. In addition, concentrations of all metals at Mary Lake sediment stations, including manganese, were comparable to those of the reference lake littoral and/or profundal sediment stations (Figure 5.12), suggesting no mine influence on sediment metal chemistry of Mary Lake since the onset of Mary River Project mine operations.

5.2.3 Phytoplankton

Chlorophyll a concentrations at Mary Lake showed no spatial gradients with distance from either the Tom River inlet or the Mary River inlet towards the lake outlet during any of the winter, summer or fall sampling events in 2016 (Figure 5.13). Similar to the other mine-exposed lakes, chlorophyll a concentrations generally showed significant differences among winter, summer and fall sampling events at both the north and south basins of Mary Lake in 2016 (Appendix Table E.4). Highest and lowest concentrations of chlorophyll a were observed in summer and winter, respectively, at both Mary Lake basins (Appendix Table E.14), and mirrored the summer and fall seasonal differences observed at the reference lake (Appendix Table B.8). Although chlorophyll a concentrations at the Mary Lake north basin were

[14] Refer to footnote 6 (page 32) regarding temporal differences in sediment boron concentrations at Mary River Project LSA waterbodies.

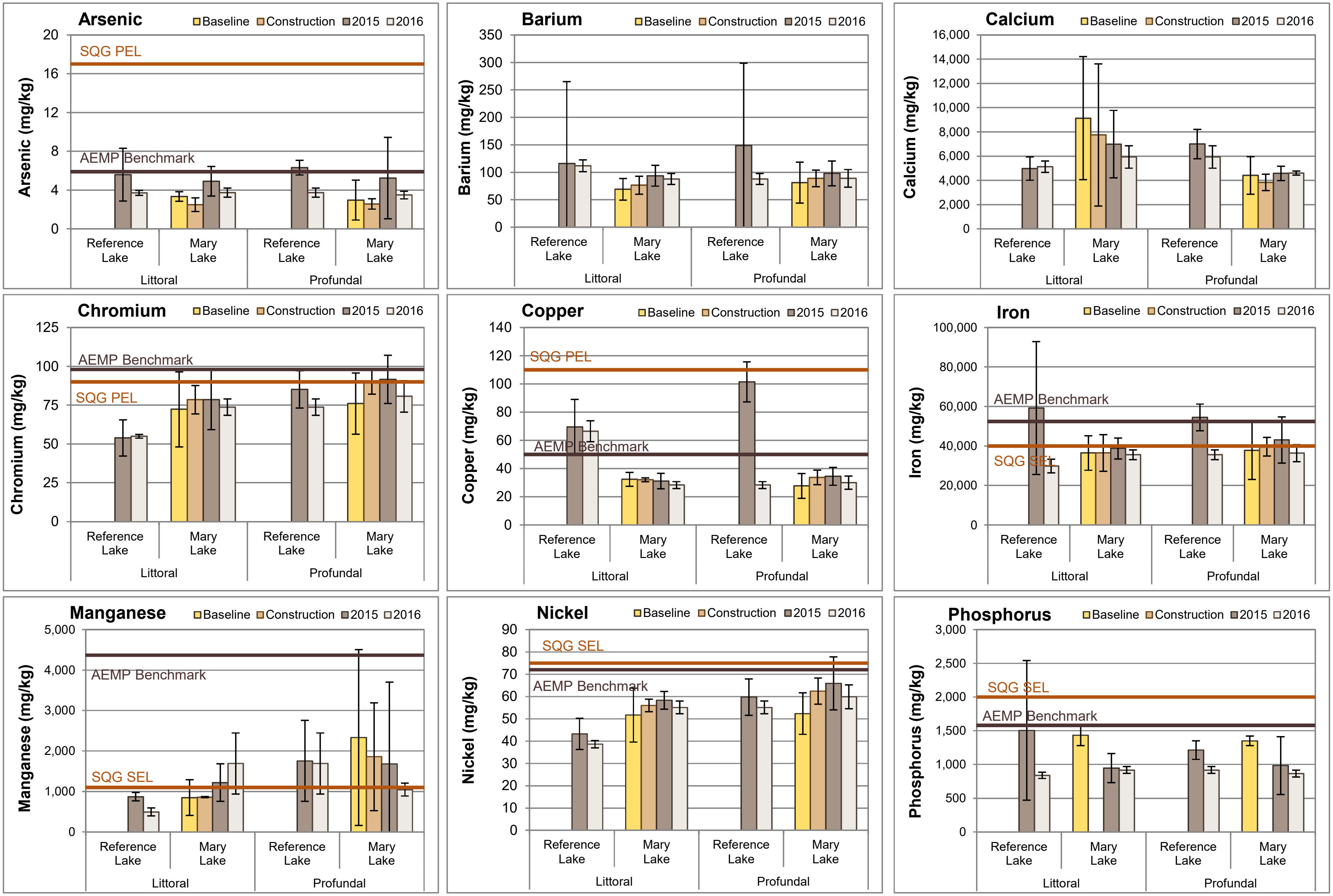

Figure 5.12: Temporal comparison of sediment metal concentrations (mean ± SD) at littoral and profundal stations of Mary Lake and Reference Lake 3 for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods, Mary River Project CREMP.

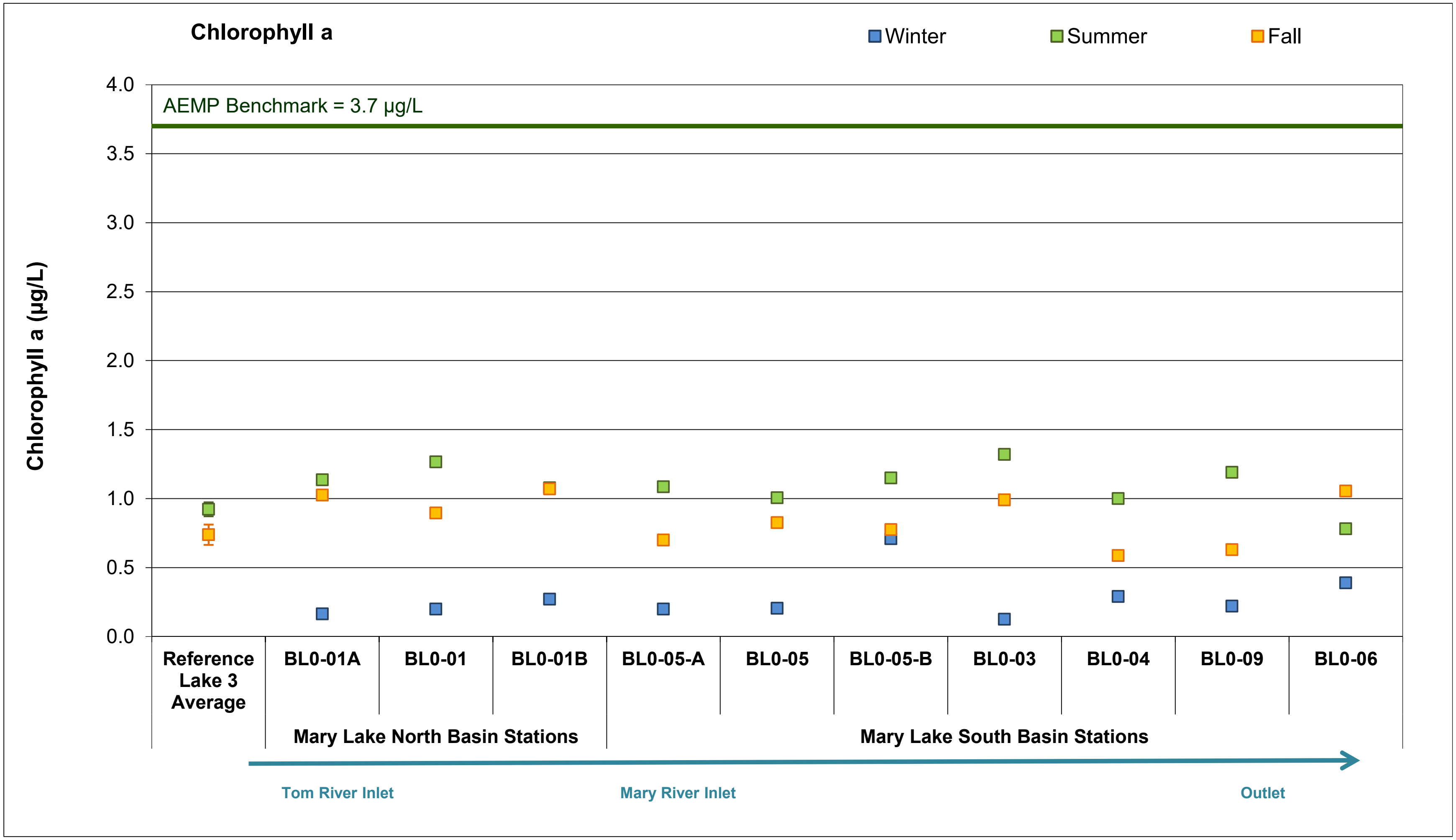

Figure 5.13: Chlorophyll a concentrations at Mary Lake (BLO) phytoplankton monitoring stations, Mary River Project CREMP, 2016. Values presented are averages of samples taken from the surface and the bottom of the water column at each station. Reference values represent mean ± standard deviation (n = 3). Reference Lake 3 was not sampled in winter 2016.

significantly higher than at the reference lake, concentrations did not differ significantly between the Mary Lake south basin and Reference Lake 3 for both the summer and fall sampling events in 2016 (Appendix Tables E.5 and E.6). The Mary Lake chlorophyll a concentrations were well below the AEMP benchmark of 3.7 µg/L during all winter, summer and fall sampling events in 2016 (Figure 5.13). Chlorophyll a concentrations at Mary Lake reflected an ‘oligotrophic’ primary productivity categorization (sensu Wetzel 2001), which agreed closely with an ‘oligotrophic’ CWQG categorization based on mean aqueous total phosphorus concentrations between 4 – 10 µg/L for the Mary Lake winter, summer and fall sampling events in 2016 (Table 5.2; Appendix Tables C.58 – C.59).

Temporal comparisons of the Mary Lake chlorophyll a data did not indicate any significant differences among the mine construction (2014) and operational (2015, 2016) yearly data that were consistent over the winter, summer or fall seasons with the exception of significantly higher concentrations in fall 2016 than in fall 2014 (Figure 5.14; Appendix Tables E.14 and E.15). In addition, annual average chlorophyll a concentrations did not differ significantly among 2014, 2015 and 2016 (Appendix Tables E.15 and E.16), suggesting no changes in the trophic status of Mary Lake since mine operations commenced at the Mary River Project. No chlorophyll a baseline (2005 – 2013) data are available for Mary Lake, precluding comparisons to conditions prior to the mine construction period.

5.2.4 Benthic Invertebrate Community

Benthic invertebrate community richness was significantly lower at Mary Lake compared to Reference Lake 3, but density and Simpson’s Evenness did not differ significantly between lakes for littoral station samples collected in 2016 (Table 5.4). Although differences in benthic invertebrate community structure were indicated between Mary Lake and Reference Lake 3 based on significantly differing Bray-Curtis Index, only the relative abundance of dominant taxonomic groups differed significantly between lakes and not the proportion of key FFG and HPG (Table 5.4). Similar to the other mine-exposed lakes, significantly lower and higher relative abundance of seed shrimp and chironomids, respectively, at Mary Lake compared to the reference lake potentially reflected lower sediment TOC content, higher proportion of fine-grained sediments and/or more compact sediment (i.e., lower moisture content) at the Mary Lake littoral stations (Appendix Table D.25). Because the relative abundance of metal-sensitive Chironomidae did not differ significantly between Mary Lake and Reference Lake 3 (Table 5.4), the difference in benthic invertebrate community structure between lakes did not appear to be associated with an ecological response to aqueous and/or sediment metal concentrations.

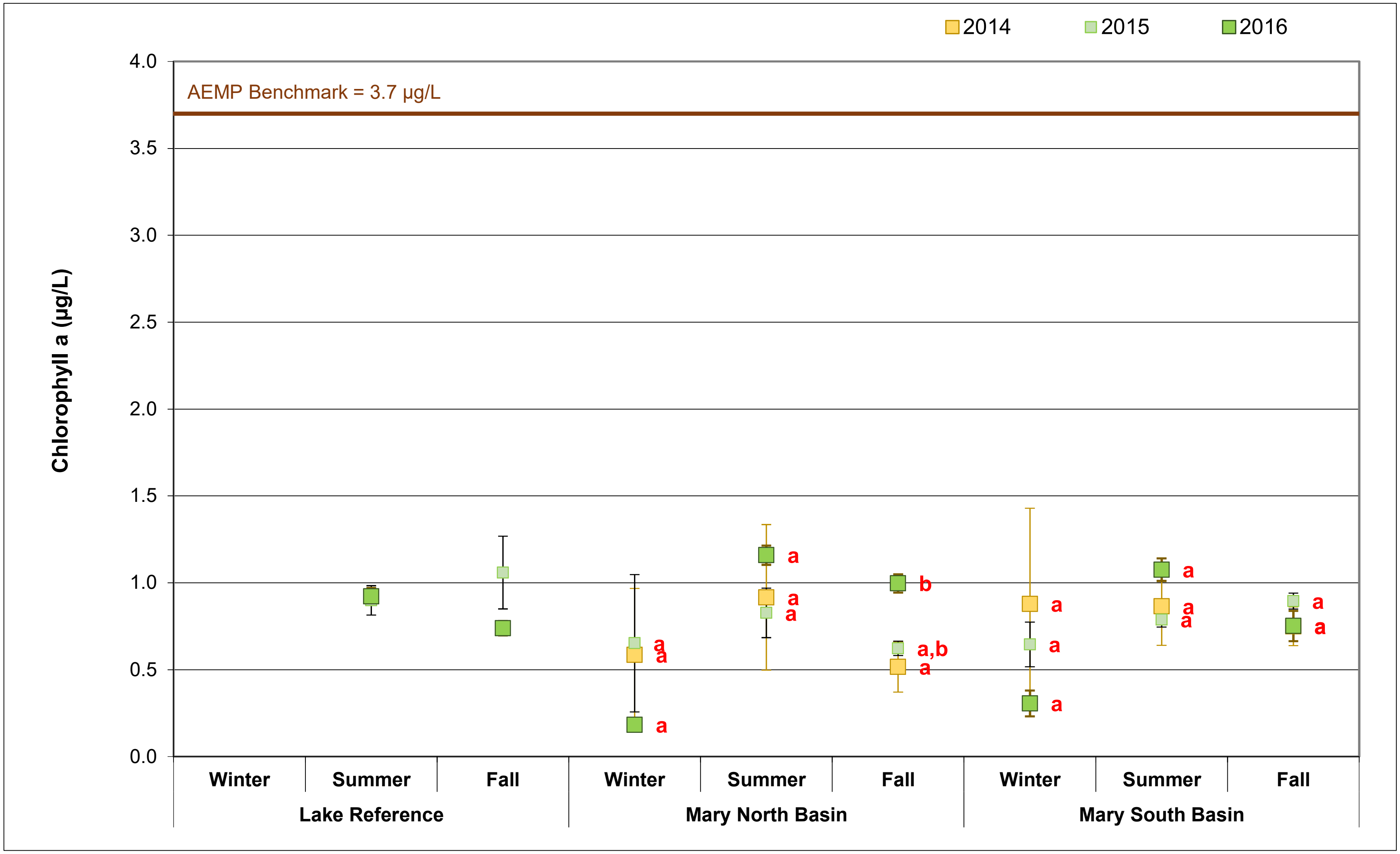

Figure 5.14: Chlorophyll a concentration seasonal comparison among 2014, 2015 and 2016 years (mean ± SE) at Mary Lake phytoplankton monitoring stations, Mary River Project CREMP. Data points with the same letter on the right do not differ significantly between years for the applicable season.

Table 5.4: Benthic invertebrate community statistical comparison results between Mary Lake (BLO) and Reference Lake 3 littoral stations, Mary River Project CREMP, August 2016.

Metric	Statistical Test Results					Summary Statistics					
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Power	Magnitude of Difference [b] (No. of SD)	Area	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Maximum
Density (Individuals/m^2)	No	0.483	ι, δ, γ	-	-	Reference Lake 3	2,390	1,396	624	897	4,240
						Mary Lake Littoral	1,947	1,591	649	457	4,036
Richness (Number of Taxa)	Yes	<0.001	ι, δ, γ	1.000	-3.2	Reference Lake 3	12.2	1.1	0.5	11.0	14.0
						Mary Lake Littoral	8.7	0.5	0.2	8.0	9.0
Simpson's (E) Krebs	No	0.249	γ	-	-	Reference Lake 3	0.758	0.189	0.084	0.420	0.849
						Mary Lake Littoral	0.574	0.299	0.122	0.249	0.958
Bray-Curtis Index	Yes	0.000	α, δ, γ	1.000	4.0	Reference Lake 3	0.334	0.122	0.054	0.245	0.527
						Mary Lake Littoral	0.820	0.093	0.038	0.642	0.902
Nemata (%)	No	0.670	β, δ, γ	-	-	Reference Lake 3	4.0%	5.6%	2.5%	0.0%	13.5%
						Mary Lake Littoral	3.6%	7.5%	3.1%	0.0%	18.8%
Hydracarina (%)	No	0.382	β, δ, γ	-	-	Reference Lake 3	3.6%	2.0%	0.9%	1.8%	6.7%
						Mary Lake Littoral	3.3%	4.2%	1.7%	0.7%	11.4%
Ostracoda (%)	Yes	0.004	β, ε, γ	0.982	-2.6	Reference Lake 3	46.9%	17.5%	7.8%	37.8%	78.0%
						Mary Lake Littoral	2.3%	2.2%	0.9%	0.0%	5.0%
Chironomidae (%)	Yes	0.002	β, δ, γ	0.992	2.4	Reference Lake 3	45.4%	18.8%	8.4%	15.4%	59.2%
						Mary Lake Littoral	90.6%	12.2%	5.0%	66.1%	99.1%
Metal-Sensitive Chironomidae (%)	No	1.000	γ	-	-	Reference Lake 3	19.3%	8.3%	3.7%	7.7%	28.1%
						Mary Lake Littoral	19.2%	13.3%	5.4%	1.7%	33.9%
Collector-Gatherers (%)	No	0.865	β, δ, γ	-	-	Reference Lake 3	75.0%	11.4%	5.1%	61.1%	89.7%
						Mary Lake Littoral	73.5%	24.7%	10.1%	28.2%	94.9%
Filterers (%)	No	0.246	β, ε, γ	-	-	Reference Lake 3	16.1%	8.4%	3.8%	7.0%	26.4%
						Mary Lake Littoral	12.4%	13.2%	5.4%	0.0%	31.6%
Clingers (%)	No	0.457	β, δ, γ	-	-	Reference Lake 3	19.2%	7.6%	3.4%	8.8%	28.3%
						Mary Lake Littoral	16.5%	13.1%	5.3%	1.7%	37.4%
Sprawlers (%)	No	0.855	β, δ, γ	-	-	Reference Lake 3	65.7%	12.1%	5.4%	57.2%	85.7%
						Mary Lake Littoral	64.8%	32.9%	13.4%	8.0%	97.4%
Burrowers (%)	No	0.581	β, δ, γ	-	-	Reference Lake 3	15.1%	6.2%	2.8%	5.5%	22.2%
						Mary Lake Littoral	18.7%	21.4%	8.7%	0.9%	54.6%

[a] Data analysis included: α - data untransformed; β - data logit transformed; ι - log_{10} transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

[b] Magnitude calculated by comparing the difference between the reference area and mine-exposed area means divided by the reference area standard deviation.

[grey box] Highlighted values indicate significant differences between study areas based on ANOVA p-value less than 0.10 that were also outside of a Critical Effect Size of ±2 SD, suggesting an ecologically meaningful difference.

BOLD Bold text values indicate significant differences between study areas based on ANOVA p-value less than 0.10, but a Critical Effect Size within ±2 SD, suggesting the difference is not ecologically meaningful.

Temporal comparisons of the Mary Lake benthic invertebrate community data did not indicate any significant differences in density, richness, Simpson's Evenness and the relative abundance of dominant taxonomic groups and FFG among data collected in 2015 and 2016 mine operational years and in 2007 prior to mine operation (i.e., baseline; Figure 5.15; Appendix Table F.44). The close similarity in benthic invertebrate community endpoints among years was consistent with the relatively minor changes in water and sediment chemistry observed at Mary Lake between the mine operational and baseline periods (Sections 5.2.1 and 5.2.2). Moreover, no mine-related influence on lotic benthic invertebrate communities was apparent within the Mary River downstream of the mine, suggesting a low potential for mine-related effects to biota of Mary Lake. The benthic invertebrate community at littoral stations of Mary Lake showed consistently lower and higher relative abundance of seed shrimp and chironomids, respectively, compared to the reference lake in both 2015 and 2016, but no consistent differences in richness and Simpson's Evenness, and no differences entirely for density, FFG and HPG endpoints (Appendix Table F.44). This suggested that factors contributing to differences in benthic invertebrate community structure between Mary Lake and Reference Lake 3 remained relatively unchanged over the 2015 to 2016 studies.

5.2.5 Fish Population

5.2.5.1 Mary Lake (South) Fish Community

Arctic charr and ninespine stickleback comprised the fish community of Mary Lake, mirroring the fish species composition observed at Reference Lake 3 (Table 5.5). Similar to the other mine-exposed lakes, Arctic charr CPUE was much higher at Mary Lake than at the reference lake for electrofishing and gill netting collection methods, suggesting higher densities and/or productivity of Arctic charr at Mary Lake. Consistent with the other mine-exposed lakes, greater numbers of Arctic charr, together with greater density of benthic invertebrates, suggested that secondary productivity was higher at Mary Lake than at Reference Lake 3.

Temporal comparison of the Mary Lake electrofishing catch data indicated that Arctic charr CPUE was much higher in 2016 and other years of mine construction/operation than during baseline monitoring conducted in 2008 (Figure 5.16). Similar to other mine-exposed lakes, Arctic charr CPUE for gill net collections was markedly higher in 2016 compared to all previous baseline (2007 – 2008), mine construction (2014) and mine operational (2015) studies (Figure 5.15), reflecting efficiencies in sampling relative to previous studies. Overall, the CPUE data were not indicative of temporal changes in the relative abundance of Arctic charr at the nearshore or littoral/profundal areas of Mary Lake.

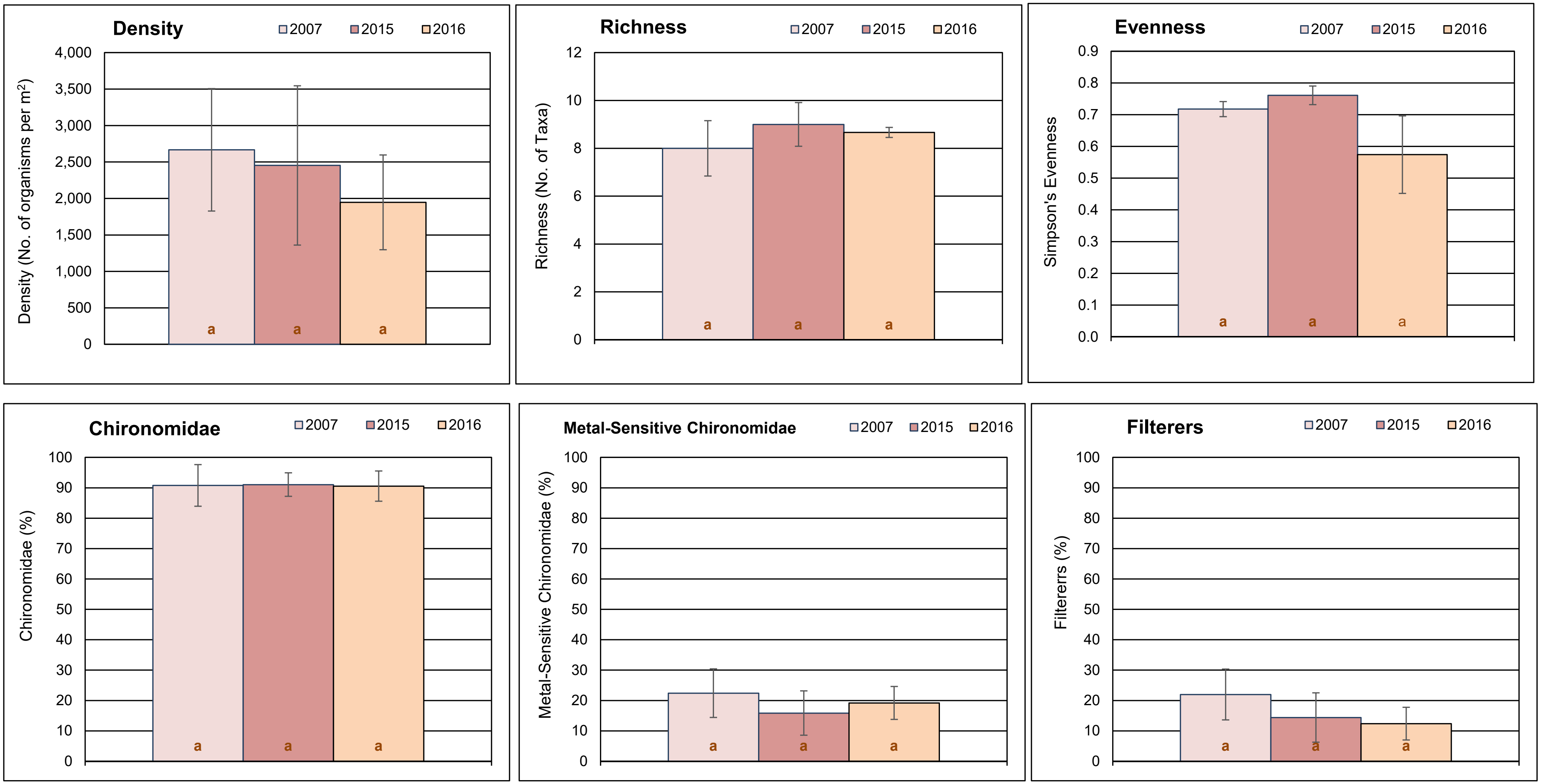

Figure 5.15: Comparison of key benthic invertebrate metrics (mean ± SE) at Mary Lake littoral stations between mine baseline (2007) and operational (2015, 2016) periods, Mary River Project CREMP, 2016. The same like-coloured letter inside bars indicate no significant difference between areas.

Table 5.5: Fish catch and community summary from backpack electrofishing and gill netting conducted at Mary Lake (BLO) and Reference Lake 3 (REF3), Mary River Project CREMP, August 2016.

Lake	Method [a]		Arctic Charr	Nine-spine Stickleback	Total by Method	Total No. of Species
Reference Lake 3	Electrofishing	No. Caught	101	28	129	2
		CPUE	0.48	0.16	0.64	
	Gill netting	No. Caught	14	0	14	
		CPUE	0.15	0	0.15	
Mary Lake	Electrofishing	No. Caught	107	1	108	2
		CPUE	1.36	0.01	1.38	
	Gill netting	No. Caught	97	0	97	
		CPUE	5.31	0	5.31	

[a] Catch-per-unit-effort (CPUE) for electrofishing represents the number of fish captured per electrofishing minute, and for gill netting represents the number of fish captured per 100 m hours of net.

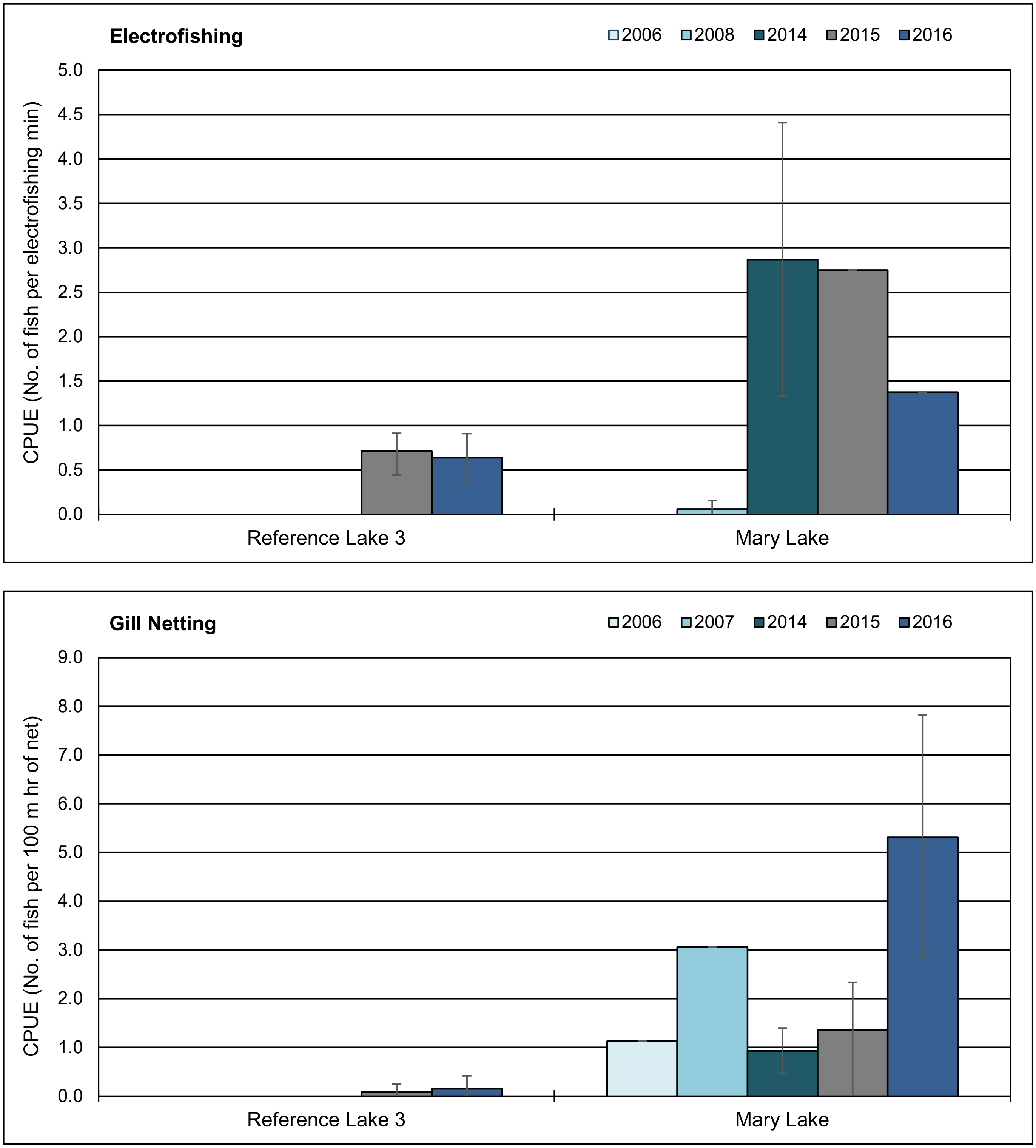

Figure 5.16: Catch-per-unit-effort (CPUE; mean ± SD) of Arctic charr captured by backpack electrofishing and gill netting at Mary Lake (BLO) for baseline (2006, 2007, 2008), mine construction (2014) and operational (2015, 2016) periods during the fall, Mary River Project CREMP.

5.2.5.2 Mary Lake (South) Fish Population Assessment

Nearshore Arctic Charr

Mine-related influences on the Mary Lake nearshore Arctic charr population were assessed with a control-impact analysis using data collected from Mary Lake and Reference Lake 3 in 2016. No nearshore Arctic charr baseline data were collected at Mary Lake, precluding data analysis using a before-after design. A total of 100 Arctic charr captured at nearshore habitat at each of Mary Lake and Reference Lake 3 in August 2016 were used for the control-impact analysis. Distinction of Arctic charr YOY from the older, non-YOY age class was possible using a fork length cut-off of 4.9 and 5.1 cm based on the evaluation of length-frequency distributions coupled with supporting age determinations for the Mary Lake and Reference Lake 3 data sets, respectively (Figure 5.17). Due to a low number of Arctic charr YOY captured at the Mary Lake nearshore (i.e., 5), fish health comparisons were conducted using only non-YOY individuals, where applicable, to limit confounding influences of naturally differing weight-at-length relationships between YOY and non-YOY individuals on the data interpretation.

Nearshore Arctic charr length-frequency distributions differed significantly between Mary Lake and Reference Lake 3, reflecting the occurrence of very few YOY and greater numbers of larger individuals at Mary Lake (Table 5.6; Figure 5.17; Appendix Table G.34). However, nearshore Arctic charr non-YOY size, growth and condition did not differ significantly between Mary Lake and Reference Lake 3 in 2016 (Table 5.6; Appendix Table G.34). Fewer significant differences between nearshore Arctic charr populations of Mary Lake and Reference Lake 3 were evident in 2016 than in 2015 (Table 5.6). The dissimilarity in endpoints that differed between studies may have reflected small samples sizes of approximately ten individuals used for the age and growth endpoint comparisons during each study. Nevertheless, similar to the other mine-exposed lakes, no adverse mine-related influences on nearshore Arctic charr energy use and storage were suggested at Mary Lake for either of the 2015 and 2016 studies.

Littoral/Profundal Arctic Charr

Mine-related influences on the Mary Lake littoral/profundal Arctic charr population were assessed with a before-after analysis using data collected from Mary Lake in 2016 and during 2006-2007 baseline monitoring. Similar to the 2015 CREMP, a small sample size from Reference Lake 3 (i.e., n = 14) precluded meaningful control-impact statistical analysis using data collected in 2016. Biological information collected from Arctic charr mortalities indicated that non-spawners of reproductive age constituted approximately 63% of the Mary Lake Arctic charr population during the August 2016 field study (Appendix Table G.38). On average, Arctic charr non-spawners exhibited similar age, size (length and weight) and LSI than females with

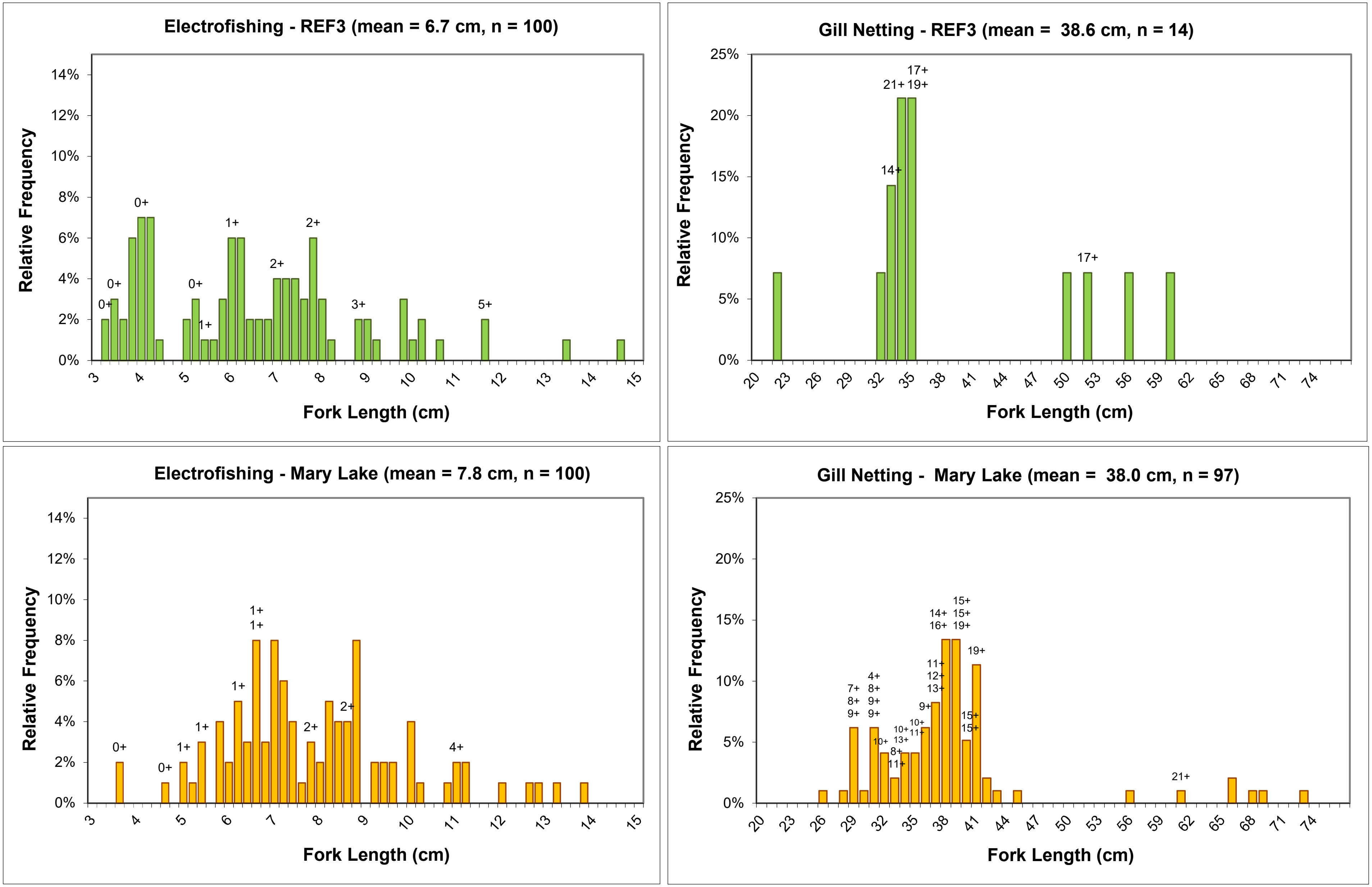

Figure 5.17: Length-frequency distributions for Arctic charr captured by backpack electrofishing and gill netting at Mary Lake and Reference Lake 3 (REF3), August 2016, Mary River Project CREMP. Fish ages are shown above the bars, where available.

Table 5.6: Summary of statistical results for Arctic charr population comparisons between Mary Lake and Reference Lake 3 for the mine operational period (2015, 2016) and between Mary Lake mine-operational and baseline period data for fish captured by electrofishing and gill netting methods, Mary River Project CREMP, August 2016. Values in parentheses indicate direction and magnitude of any signficant differences.

Data Set by Sampling Method	Response Category	Endpoint	Statistically Significant Differences Observed?			
			versus Reference Lake 3		versus Mary Lake baseline period data [b]	
			2015	2016	2015	2016
Electrofishing Samples	Survival	Length-Frequency Distribution	No	**Yes**	-	-
		Age	**Yes (-43%)**	No	-	-
	Energy Use	Size (mean weight)	No	No	-	-
		Size (mean fork length)	No	No	-	-
		Growth (weight-at-age)	**Yes (+99%)**	No	-	-
		Growth (fork length-at-age)	**Yes (+23%)**	No	-	-
	Energy Storage	Condition (body weight-at-fork length)	**Yes (+3%)**	No	-	-
Gill Netting Samples [a]	Survival	Length Frequency Distribution	-	-	**Yes**	**Yes**
		Age	-	-	No	**Yes (-14%)**
	Energy Use	Size (mean weight)	-	-	**Yes (+19%)**	No
		Size (mean fork length)	-	-	**Yes (+6%)**	No
		Growth (weight-at-age)	-	-	No	**Yes (nc)**
		Growth (fork length-at-age)	-	-	No	**Yes (nc)**
	Energy Storage	Condition (body weight-at-fork length)	-	-	No	**Yes (+3%)**

[a] Due to low catches of Arctic charr at Reference Lake 3 in 2015 and 2016, no comparison of fish health was possilbe for gill netted fish.

[b] No baseline period data collected for nearshore electrofishing; baseline period littoral/profundal gill netting data included combined 2006 and 2007 information.

developing gonads (Appendix Table G.38). A high proportion of individuals (i.e., 85%) also contained body cavity parasites (Appendix Table G.38), the incidence rate of which was comparable to that observed at other mine-exposed lakes and during historical studies at mine LSA lakes. One Arctic charr that had been tagged and released previously at Mary Lake was re-captured in 2016, and showed a 26.3 mm/yr average increase in fork length over the past 9 years (Table 5.7). This growth rate showed close agreement with the incremental change in growth rate for a recaptured tagged individual from Mary Lake in 2015 (Table 5.7), as well as resident populations in other Arctic lakes available in published literature. Growth of tagged Arctic charr appeared to be considerably higher at Mary Lake than at the northwest and southeast basins of Sheardown Lake, where tagged Arctic charr showed a mean annual incremental increase in fork length of 7.5 mm/yr (Tables 4.7 and 5.7; Minnow 2016a). The tagging information suggested that Arctic charr may reside in a same lake for a prolonged period, and that faster growth rates in Arctic charr may be associated with larger lake size.

Table 5.7: Length and weight measurement data for tagged Arctic charr captured at the Mary Lake south basin in August 2015 and 2016, Mary River Project CREMP.

Fish Tag Number	Capture Information			Re-Capture Information			Growth Rate
	Date of Capture	Length (mm)	Weight (g)	Date of Capture	Length (mm)	Weight (g)	Δ Length (mm/yr)
83214	30-Jul-2007	392	500	19-Aug-2015	587	2,250	24.4
85533	29-Jul-2007	422	725	19-Aug-2016	660	>2,500	24.4

Length-frequency distributions of Arctic charr captured at littoral/profundal areas of Mary Lake in 2016 differed significantly from those captured during the baseline period (Table 5.6; Appendix Table G.37). On average, Arctic charr captured at littoral/profundal areas of Mary Lake in 2016 were significantly younger than those captured during the baseline period, but no significant differences in mean size were shown between these mine periods (Table 5.6). No definitive differences in adult Arctic charr growth were indicated between 2016 and the baseline data at Mary Lake based on considerable overlap of data (Appendix Figure G.23). Similarly, although adult Arctic charr condition differed significantly between 2016 and the baseline period, the magnitude of this difference was within ±10% CES_C (Table 5.6) suggesting that this difference was not ecologically meaningful. The responses of Arctic charr captured at littoral/profundal areas of Mary Lake in 2016 were generally not consistent with those documented in 2015 for comparisons to baseline, which potentially reflected natural sampling variability between years.

5.3 Synthesis of Mine-Related Influences at the Mary River and Mary Lake System

5.3.1 Mary River

No mine-related influences on water quality were apparent at Mary River in 2016. Although total concentrations of a number of metals, including aluminum, chromium, copper, iron, lead, manganese, nickel and phosphorus, were elevated at one or more mine-exposed areas of the Mary River in 2016 compared to reference and baseline data, naturally high turbidity in 2016 likely accounted for these spatial and temporal differences. This was supported by the occurrence of similar dissolved metal concentrations in 2016 compared to Mary River reference and baseline data, by significant positive correlations between total concentrations of key metals (e.g., aluminum, manganese) and turbidity, and by observations of high ratios of total to dissolved metal concentrations for the Mary River water quality data. Notably, turbidity within Mary River was consistently highest upstream of the mine (i.e., the GO series stations) during all mine baseline (2005 – 2013), construction (2014) and operational (2015, 2016) periods, indicating that the dominant source of turbidity at mine-exposed areas of the Mary River reflected natural (runoff) inputs unrelated to the mine operation. Although total aluminum, copper, iron, lead and phosphorus concentrations were above WQG and/or AEMP benchmarks at one or more Mary River mine-exposed stations in 2016, as discussed above, the elevation in these metals compared to water quality criteria appeared to be associated with naturally high turbidity.

Chlorophyll a concentrations were similar among the ten Mary River phytoplankton monitoring stations, with no significant differences in annual chlorophyll a concentrations indicated between Mary River mine-exposed and reference stations. Although lower chlorophyll a concentrations were indicated at individual Mary River stations in 2016 compared to the baseline period, these differences likely reflected higher natural turbidity in 2016, which would be expected to affect phytoplankton productivity by limiting the amount of light available for photosynthesis. No adverse or ecologically meaningful significant differences in benthic invertebrate density, richness or relative abundance of metal-sensitive taxa were shown between Mary River mine-exposed areas compared to an upstream reference area (i.e., GO- 09) in 2016. Although some differences in community composition were indicated between the Mary River mine-exposed and reference areas in 2016, these differences appeared to be related to naturally greater substrate embeddedness at the mine-exposed areas rather than a mine-related influence. Temporal comparisons indicated significantly higher Simpson's Evenness and significantly lower relative abundance of chironomid midges at Mary River mine-exposed areas compared to the reference area between the 2016 and baseline studies. However, because the direction of these responses was opposite to those typically related to adverse mine-related effects, natural temporal variability and/or sampling artifacts of the CREMP likely accounted for the temporal differences in these endpoints.

5.3.2 Mary Lake

At Mary Lake, turbidity and aqueous concentrations of total aluminum, manganese and uranium were elevated (i.e., ≥3-fold higher) compared to the reference lake in 2016, but none of these metals, or any other parameters, were consistently elevated compared to concentrations observed during the baseline period, and none were above WQG or AEMP benchmarks. Similar to Sheardown Lake, turbidity at Mary Lake was naturally higher than the reference lake as a result of receiving flow from relatively large river systems (i.e., Tom River and Mary River inflows to the Mary Lake north and south basins, respectively). Aluminum and manganese were consistently shown to be associated with turbidity at all mine lakes, including Mary Lake, which suggested that these metals were largely bound to/comprised the suspended particulate matter and were thus unlikely to be biologically available. Sediment metal concentrations at Mary Lake littoral and profundal stations were similar to those at the reference lake in 2016 and, with the exception of slightly elevated sediment manganese concentrations at littoral stations, were similar to concentrations observed during the baseline period. Although sediment chromium, iron and manganese concentrations were above SQG at Mary Lake in 2016, with the exception of chromium, these metals were also above SQG at the reference lake suggesting low potential for any adverse effects to biota associated with these metals. No metals were observed at concentrations above the sediment AEMP benchmarks at littoral and profundal stations of Mary Lake in 2016.

Mary Lake chlorophyll a concentrations were significantly higher than at the reference lake in 2016, but only at the north basin. However, Mary Lake chlorophyll a concentrations were continuously well below the AEMP benchmark during all seasonal sampling events in 2016, and were indicative of oligotrophic conditions normally encountered in Arctic waterbodies. No significant differences in annual chlorophyll a concentrations were indicated among the mine construction (2014) and operational (2015, 2016) periods, suggesting no changes in the trophic status of Mary Lake since commencement of mine operations. Benthic invertebrate community data collected at littoral habitat of Mary Lake in 2016 indicated significantly lower richness and relative abundance of ostracods, and significantly higher relative abundance of chironomids, but no differences in density, evenness and relative abundance of metal sensitive taxa, FFG and HPG compared to the reference lake. Similar to Sheardown Lake, the differences in community composition appeared to reflect naturally differing sediment TOC and/or particle size between Mary Lake and the reference lake in 2016. No significant differences in any primary and FFG benthic metrics were indicated between 2016 and 2007 baseline data for Mary Lake littoral habitat. Analysis of Mary Lake Arctic charr populations suggested greater fish abundance compared to the reference lake in 2016, but no definitive changes in numbers of Arctic charr in 2016 relative to baseline data. No significant or ecologically meaningful differences in growth and condition of nearshore captured Arctic charr occurred between Mary Lake and the reference lake in 2016, nor between Arctic charr collected in 2016 compared to the baseline period for nearshore and littoral/profundal Arctic charr populations at Mary Lake. Collectively, the chlorophyll a, benthic invertebrate community and Arctic charr fish population data all suggested no adverse mine-related influences to the biota of Mary Lake in the second year of mine operation at the Mary River Project.

6.0 CONCLUSIONS

The objective of the 2016 Mary River Project CREMP was to evaluate potential mine-related influences on chemical and biological conditions at aquatic environments located near the mine following the second full year of ERP mine operation. Additional attention towards the evaluation of sedimentation-related effects was conducted as part of the 2016 CREMP assessment in consideration of an Environment and Climate Change Canada FAD and an Indigenous and Northern Affairs Canada LNC related to unauthorized sediment releases in 2016. The 2016 CREMP utilized an effects-based approach that included standard environmental effects monitoring techniques to provide rigorous analysis of potential mine-related effects at key receiving water bodies. Under this approach, water quality and sediment quality data were used to support the interpretation of phytoplankton, benthic invertebrate community, and fish population survey data collected at mine-exposed areas of the Camp Lake, Sheardown Lake, Mary River and Mary Lake systems. The evaluation of potential mine-related effects within these systems was based on comparisons of the 2016 data to applicable reference data and to available baseline data. Potential mine-related effects identified in the 2016 CREMP are provided separately below for the Camp, Sheardown and Mary River/Lake systems.

6.1 Camp Lake System

Within the Camp Lake system, mine-related effects on water quality were apparent mainly within the main stem channel of Camp Lake Tributary 1 (CLT1) and at Camp Lake. Conductivity and concentrations of mine parameters including chloride, nitrate, sulphate and metals including iron, manganese, molybdenum, sodium, strontium and uranium were the primary constituents reflecting a mine-related influence within CLT1 and Camp Lake in 2016 based on elevation (i.e., ≥3-fold higher) relative to reference conditions and/or to the baseline (2005 – 2013) period. Of these parameters, only iron and uranium concentrations were above applicable water quality guideline (WQG) and/or AEMP benchmarks, but only at the upper-most monitoring station on the CLT1 main stem. Active quarrying at the QMR2 pit in 2016 likely served as the key source for these parameters at CLT1. Water chemistry at Camp Lake Tributary 2 (CLT2) was similar to applicable reference stations and to baseline water quality, with all parameters consistently observed at concentrations below applicable WQG and AEMP benchmarks. Overall, mine-related effects to water quality of the Camp Lake system were evident at the upper main stem of CLT1 and Camp Lake, with minimal effects suggested at CLT2, following the second year of mine operation. Sediment arsenic and manganese concentrations were slightly elevated (i.e., 2- to 5-fold higher) at Camp Lake littoral stations compared to mean reference lake concentrations in 2016, and together with molybdenum, were also elevated compared to concentrations during the baseline period, suggesting a mine-related influence on sediment quality of Camp Lake. No metals were elevated in sediment of the profundal stations compared to the reference lake in 2016. Phosphorus was the only parameter observed at concentrations above SQG in littoral and profundal sediment of Camp Lake that was not also above applicable SQG at the reference lake in 2016.

Chlorophyll a concentrations were elevated at the upper main stem of CLT1 (Station L2-03) and within Camp Lake compared to respective reference areas and to baseline data, suggesting slight enrichment possibly related to higher aqueous nitrate and/or micro-nutrient concentrations from Mary River Project mine activities. However, chlorophyll a concentrations at CLT1 north branch and lower main stem areas, and at CLT2 in 2016, were comparable to applicable reference and baseline concentrations. In addition, chlorophyll a concentrations were consistently well below the AEMP benchmark at all Camp Lake system receivers in 2016 indicating no adverse mine influence to phytoplankton. No adverse mine-related influences on the benthic invertebrate community of the Camp Lake system, including CLT1, CLT2 and Camp Lake, were indicated in 2015 based on comparisons to respective reference areas and to baseline studies. In fact, consistent with the chlorophyll a data, benthic data collected at the upper main stem of CLT1 suggested a slight enrichment-related influence based on higher invertebrate density, richness and proportion of FFG filter feeders compared to Unnamed Reference Creek. The fish population survey suggested greater fish abundance compared to the reference lake in 2016, but similar numbers of Arctic charr in 2016 relative to the Camp Lake baseline studies. No significant, ecologically meaningful, differences in Arctic charr condition were indicated between Camp Lake and the reference lake in 2016, nor between Camp Lake Arctic charr collected in 2016 compared to the baseline period, for nearshore and littoral/profundal Arctic charr populations. Overall, consistent with the water chemistry and sediment chemistry generally meeting respective environmental quality guidelines and AEMP benchmarks, the phytoplankton, benthic invertebrate community and fish population survey data collectively suggested no adverse mine-related influences to the biota of the Camp Lake system in the second year of mine operation at the Mary River Project.

6.2 Sheardown Lake System

At Sheardown Lake Tributary 1 (SDLT1), aqueous concentrations of several parameters were elevated compared to average concentrations observed at the reference creek stations in 2016. However, similar to the 2015 CREMP, only nitrate and sulphate concentrations were elevated at SDLT1 in 2016 compared to the baseline period and, with the exception of copper, no parameters were present at concentrations above WQG or AEMP benchmarks in 2016. Within Sheardown Lake, aqueous total concentrations of aluminum, manganese, molybdenum and/or uranium were elevated compared to the reference lake in both 2015 and 2016, but none of these metals, or any other parameters, were elevated compared to concentrations observed during the baseline period, and none were above WQG or AEMP benchmarks. Similar to findings of the 2015 CREMP, elevated total aluminum and manganese concentrations were correlated with greater turbidity in 2016 suggesting that these metals were largely bound to/composed the suspended particulate matter and were not likely biologically available. Sediment metal concentrations at Sheardown Lake littoral stations in 2016 were similar to those at the reference lake and comparable to baseline with the exception of slightly elevated arsenic, manganese and/or molybdenum concentrations, suggesting some mine-related influences on Sheardown Lake sediment quality. However, sediment metal concentrations at Sheardown Lake profundal stations in 2016 were similar to the reference lake and baseline data, indicating that mine-related influences on sediment quality were confined to littoral habitats. Notably, no metals were present in sediment of Sheardown Lake at concentrations above SQG or AEMP benchmarks that were not above these criteria at the reference lake, suggesting the natural occurrence of elevated concentrations of some metals (e.g., iron, manganese) in sediment of lakes in the Mary River Project LSA.

Chlorophyll a concentrations at SDLT1 and Sheardown Lake were greater than concentrations observed at respective reference areas, but were similar to chlorophyll a concentrations reported during mine baseline and construction periods, respectively. In all cases, chlorophyll a concentrations were well below the AEMP benchmark at all Sheardown Lake system monitoring stations, suggesting no adverse mine-related effects to phytoplankton within the system. Consistent with higher chlorophyll a concentrations, greater relative abundance of FFG filterers and organism density at SDLT1 in 2016 compared to Unnamed Reference Creek and the baseline period, respectively, suggested a slight enrichment influence. However, a greater relative abundance of HPG burrowers at SDLT1 and SDLT12 compared to the Unnamed Reference Creek and to baseline data (SDLT12 only) was potentially indicative of sedimentation influences at these tributaries in 2016. No adverse mine-related influences to benthic invertebrate communities of SDLT9 and the Sheardown Lake littoral benthic invertebrate community were apparent in 2016 based on comparisons to respective reference areas and/or to baseline data. Greater Arctic charr abundance was suggested at the Sheardown Lake NW and SE basins compared to the reference lake in 2016, but similar relative numbers of Arctic charr were indicated between 2016 and baseline studies for both basins. The Arctic charr population exhibited different direction of significant responses in growth and condition between Sheardown Lake and the reference lake in 2016, and between Arctic charr collected at nearshore and littoral/profundal habitats for Sheardown Lake in 2016 compared to baseline studies. The differential responses in Arctic charr population endpoints suggested that the various differences between the mine-exposed and reference areas, or between studies at Sheardown Lake, reflected natural variability in the resident fish population. Overall, the chlorophyll a, benthic invertebrate community and Arctic charr fish population data all suggested no adverse mine-related influences to the biota of Sheardown Lake in the second year of mine operation at the Mary River Project.

6.3 Mary River and Mary Lake System

At Mary River, no adverse mine-related influences on water chemistry were apparent at the mine-exposed areas in 2016 based on comparisons to the Mary River upstream reference area and to baseline period water chemistry taking influences of naturally high turbidity into account. At Mary Lake, aqueous total aluminum, manganese and uranium concentrations were elevated compared to the reference lake in 2016, but concentrations of these metals and all other parameters were comparable to concentrations during the baseline period, and none were above WQG or AEMP benchmarks. Similar to Sheardown Lake and Mary River, aluminum and manganese concentrations were correlated with turbidity at Mary Lake, which suggested that these metals were largely bound to/composed the suspended particulate matter and were thus unlikely to be biologically available. Sediment metal concentrations at Mary Lake littoral and profundal stations were similar to those at the reference lake in 2016 and, with the exception of slightly elevated sediment manganese concentrations at littoral stations, were similar to concentrations observed during the baseline period. Although sediment chromium, iron and manganese concentrations were above SQG at Mary Lake in 2016, with the exception of chromium, these metals were also above respective criteria at the reference lake suggesting low potential for any adverse effects to biota associated with these metals. No metals were observed at concentrations above the sediment AEMP benchmarks at littoral and profundal stations of Mary Lake in 2016.

Chlorophyll a concentrations at Mary River and Mary Lake were generally similar to, or slightly higher than, respective reference areas in 2016. Although lower chlorophyll a concentrations were indicated at individual Mary River stations in 2015 and 2016 compared to the baseline period, these differences likely reflected naturally turbidity in both 2015 and 2016, which would be expected to affect phytoplankton productivity by limiting the amount of light available for photosynthesis. In all cases, chlorophyll a concentrations were well below the AEMP benchmark, indicating no adverse mine-related influences to phytoplankton of the Mary River/Mary Lake system. The benthic invertebrate community of the Mary River exhibited few differences between mine-exposed and reference areas in 2016, and compared to respective areas during the baseline period, with the direction of the few indicated differences in community composition between areas/studies opposite those responses normally reflective of an adverse mine-related effect. Benthic invertebrate community data collected at littoral habitat of Mary Lake in 2016 indicated significantly lower richness and differences in community composition compared to the reference lake that appeared to reflect natural differences in sediment physical properties between lakes. In part, this was supported by no significant differences in benthic metrics between 2016 and 2007 baseline data for Mary Lake littoral stations. The fish population survey suggested greater fish abundance at Mary Lake compared to the reference lake in 2016. No significant or ecologically meaningful differences in growth and condition of nearshore captured Arctic charr occurred between Mary Lake and the reference lake in 2016, nor between Arctic charr collected in 2016 compared to the baseline period for nearshore and littoral/profundal Arctic charr populations at Mary Lake. Overall, the chlorophyll a, benthic invertebrate community and Arctic charr fish population data all suggested no adverse mine-related influences to the biota of Mary Lake in the second year of mine operation at the Mary River Project.

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APPENDIX A

DATA QUALITY REVIEW

APPENDIX A: DATA QUALITY REVIEW

A1.0 INTRODUCTION

A1.1 Background

Data Quality Review (DQR) was conducted on data collected as part of the Mary River Project 2016 CREMP to define the overall quality of the data collected for the program, and by extension, the confidence with which the data can be used to derive conclusions. A variety of factors can influence the physical, chemical and biological measurements made in an environmental study and thus affect the accuracy and/or precision of the data. Depending on the magnitude of these influences, inaccuracy or imprecision have the potential to affect the reliability of conclusions drawn from the available data. Therefore, it is important to ensure that programs incorporate appropriate steps to control the non-natural sources of data variability (i.e., minimize the variability that does not reflect natural spatial and temporal variability in the environment) and thus assure the quality of the data.

The Mary River Project 2016 CREMP DQR involved comparison of field performance to generic environmental study data quality objectives (DQO) for the evaluation of sample blanks, data precision and data accuracy. DQO were established *a-priori* to reflect reasonable and achievable performance expectations. Overall, the intent of comparing data to DQO was not to reject any measurement that did not meet the DQO, but rather to evaluate whether, based on the available data and using a weight-of-evidence approach, the field and/or analytical sample data adequately reflected actual conditions and thus be used with confidence to derive study conclusions. Using this approach, questionable data received more scrutiny to determine what effect, if any, this had on interpretation of results within the context of this project. Quality Control (QC) samples assessed for the Mary River Project CREMP included water sample trip blanks, field blanks, equipment blanks and field duplicates, sediment sample field duplicates and the verification of the accuracy of sub-sampling and organism recovery for the benthic invertebrate component, defined as follows:

- **Blanks** (water quality samples) are samples of de-ionized water and/or appropriate reagent(s) that are handled and analyzed the same way as regular samples. These samples reflect any contamination that occurred from the equipment (in the case of equipment blanks), in the field (in the case of trip or field blanks), or in the laboratory (in the case of laboratory or method blanks). Analyte concentrations should be non-detectable, although a data quality objective of five times the method detection limit (MDL) allows for slight “noise” around the detection limit.

- **Trip blanks** are meant to detect any widespread contamination resulting from the container (including caps) and preservative during transport and storage. A trip blank is a bottle set full of de-ionized water that is prepared prior to the field sample collections, is transported with the regular sample bottles in the field, and remains unopened throughout the trip.
- **Field blanks** mimic the sampling and preservative process but do not come in contact with ambient water. Field blanks are exposed to the sampling environment at the sample site. Consequently, they provide information on contamination resulting from the handling technique and through exposure to the atmosphere. They are processed in the same manner as the associated field samples (i.e., they are exposed to all the same potential sources of contamination as the field sample), including handling and, in some cases, filtration and/or preservation.
- **Equipment blanks** are samples of de-ionized water collected from the sampling equipment following decontamination (i.e., rinsing of the sampling device using de-ionized water) in the field between sampling stations and/or events. These blanks are useful in identifying cross contamination of samples in the field as a result of the sampling device.

- **Field Duplicates** (water quality and sediment quality samples) are sub-sample pairs collected from a randomly selected field station using identical collection and handling methods that are then analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory. The data from field duplicate samples reflect natural variability, as well as the variability associated with sample collection methods, and therefore provide a measure of field precision.
- **Sub-Sampling Checks** (benthic invertebrate community samples) are used when excessive sample volume and/or organism density results in only a fraction of the original sample being analyzed. By comparing the numbers of benthic invertebrates recovered between at least two sub-samples, this measure provides an evaluation of how effective the sub-sampling method was in evenly dividing the original sample. Therefore, sub-sampling error provides a measure of analytical precision. The processing of entire samples in representative sample fractions also allows an evaluation of sub-sampling accuracy.

- **Organism Recovery Checks** (benthic invertebrate community samples) involve the re-processing of previously sorted material from a randomly selected sample to determine the number of invertebrates that were not recovered during the original sample processing. The reprocessing is conducted by an analyst not involved during the original processing to reduce any bias. This check allows the determination of accuracy through assessment of recovery efficiency.

A2.0 RESULTS

A2.1 Water Samples

A2.1.1 Sample Blanks

Trip blank samples were taken on field sampling campaigns a total of nine times during the 2016 CREMP, including during two winter lake monitoring events (April-May), one spring stream monitoring event (June), three summer lake/stream monitoring events (July), and three fall lake/stream monitoring events (August). Of the 767 total number of analyses conducted on the trip blank samples, only three (0.4%) resulted in analyte detection above the trip blank DQO of less than five-times the laboratory MDL (Appendix Table A.1). Barium and phenols were detected in trip blanks at concentrations that were above the DQO, but only during the summer sampling period. Bottle contamination or contaminated deionized source water were the most likely sources of contamination. The deionized water used to create trip blanks originated from on-site stock, and was cited as the most likely source of trip blank contamination in previous CREMP (KP 2015).

Field blanks for water samples were assessed a total of eight times during the 2016 CREMP, including on one winter lake monitoring event, one spring stream monitoring event, three summer lake/stream monitoring events, and five fall lake/stream monitoring events. Of the 683 analyses conducted, five (0.7%) resulted in analyte detection above the DQO of less than five-times the laboratory MDL (Appendix Table A.2). Similar to the trip blanks, barium and phenols were the only analytes for which concentrations above DQO were observed in the 2016 field blank samples, and only during the summer sampling period. A similar frequency of detection was observed between the trip and field blanks, which suggested that a similar source of contamination was common to both DQR sample types. These patterns suggest that laboratory water is the most likely source of contamination.

Equipment blank samples were assessed a total of 11 times during the 2016 CREMP, including on two winter lake monitoring events, five summer lake monitoring events, and four fall lake monitoring events. Of the 927 analyses conducted, 19 (2.0%) resulted in analyte detection above the DQO of less than five-times the laboratory MDL (Appendix Table A.3). Similar to the trip and/or field blanks, barium and phenols were frequently observed at concentrations above the DQO in the summer equipment blank samples. In addition to these parameters, turbidity, total aluminum, total manganese, and chlorophyll-a and phaeophytin-a were each detected above the DQO in an equipment blank sample. A greater frequency of detection was observed in the equipment blanks relative to the trip

Table A.1: Trip blank results, CREMP 2016. Highlighted values did not meet the data quality objective of ≤ five-times the laboratory method detection limit (MDL).

	Client Sample ID / Date Sampled / ALS Sample ID		Lowest MDL[1]	JL0-07	BL0-01	L1-08	REF3-01	MRY-REF3	DL0-01-4	L0-01	BL0-01A	JL0-10
	Date Sampled			25-Apr-2016	1-May-2016	27-Jun-2016	16-Jul-2016	25-Jul-2016	25-Jul-2016	19-Aug-2016	21-Aug-2016	22-Aug-2016
	ALS Sample ID			L1761257-2	L1764345-3	L1790501-30	L1806585-3	L1805146-2	L1805153-4	L1816817-3	L1817107-6	L1818109-4
Physical Tests	Conductivity	umhos/cm	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	Hardness (as $CaCO_3$)	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Total Suspended Solids	mg/L	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Turbidity	NTU	0.10	<0.10	<0.10	<0.10	<0.10	0.16	0.32	0.18	0.15	0.13
Anions and Nutrients	Alkalinity, Total (as $CaCO_3$)	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Ammonia, Total (as N)	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	0.029	<0.020	<0.020	<0.020	0.027
	Bromide (Br)	mg/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Nitrate and Nitrite as N	mg/L	0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
	Nitrate (as N)	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite (as N)	mg/L	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen	mg/L	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Phosphorus, Total	mg/L	0.0030	<0.0030	<0.0030	0.0035	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Sulfate (SO4)	mg/L	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon	Dissolved Organic Carbon	mg/L	1.0	<1.0	1.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Organic Carbon	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Metals	Aluminum (Al)	mg/L	0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000284	0.000375	<0.000050	<0.000050	<0.000050
	Beryllium (Be)	mg/L	0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	0.091	0.124	<0.050	<0.050	<0.050
	Chromium (Cr)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)	mg/L	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Manganese (Mn)	mg/L	0.000070	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070
	Mercury (Hg)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.050	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Selenium (Se)	mg/L	0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.050	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Silver (Ag)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.050	<0.050	<0.050	<0.050	0.118	<0.050	<0.050	<0.050	<0.050	<0.050
	Strontium (Sr)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Thallium (Tl)	mg/L	0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)	mg/L	0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0031	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)	mg/L	0.00060	<0.0030	<0.00060	<0.0050	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)	mg/L	0.000020	<0.00010	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.000020	<0.00010	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.000030 - 0.00010	0.000072	0.000033	<0.00010	0.000316	0.000294	0.000363	<0.000050	<0.000050	<0.000050
	Beryllium (Be)	mg/L	0.000010	<0.00050	<0.000010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	0.0000050	<0.00050	<0.0000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.0050	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.0000050	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	0.020 - 0.050	<0.050	<0.020	<0.050	0.127	0.098	0.113	<0.050	<0.050	<0.050
	Chromium (Cr)	mg/L	0.00010	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0000050	<0.00010	<0.0000050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00050	<0.00050	<0.00010	<0.00020	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)	mg/L	0.0010	<0.030	<0.0010	<0.010	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.0000090	<0.000050	<0.0000090	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00050	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	0.0050	<0.050	<0.0050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Manganese (Mn)	mg/L	0.000070	<0.000070	<0.000070	<0.00050	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070
	Mercury (Hg)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)	mg/L	0.000090	<0.00050	<0.000090	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)	mg/L	0.050		<0.050	<0.050						
	Potassium (K)	mg/L	0.050	<0.20	<0.050	<0.050	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Selenium (Se)	mg/L	0.000040	<0.0010	<0.000040	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.050	<0.10	<0.050	<0.050	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Silver (Ag)	mg/L	0.0000050	<0.000010	<0.0000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.020 - 0.50	<0.050	<0.020	<0.50	0.127	<0.050	<0.050	<0.050	<0.050	<0.050
	Strontium (Sr)	mg/L	0.000050	<0.00010	<0.000050	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Thallium (Tl)	mg/L	0.0000020	<0.00010	<0.0000020	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	0.000030	<0.00010	<0.000030	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	0.00030	<0.010	<0.00050	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.0000070	<0.000010	<0.0000070	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)	mg/L	0.000050	<0.0010	<0.000050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.00050	<0.0030	<0.00050	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)	mg/L	0.00010		<0.00010	<0.00030						
Other	Phenols (4AAP)	mg/L	0.0010	0.0028	0.0014	0.0037	<0.0010	0.0038	0.0070	0.0027	0.0027	0.0026
	Chlorophyll a	µg/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Phaeophytin a	µg/L	0.10	<0.39	0.19	0.21	0.21	0.18	0.19	0.14	0.19	0.19

[1] For some analytes, a range of MDLs were achieved in different laboratory reports. Each blank is compared to the MDL applicable to that sample.

Table A.2: Field blank results, CREMP 2015. Highlighted values did not meet the data quality objective of ≤ five-times the laboratory method detection limit (MDL).

		Client Sample ID	Lowest MDL[1]	DL0-02-3	CLT-REF3	D1-00	JL0-09	BL0-06	C0-05	REF3-03	DL0-01-07
		Date Sampled		29-Apr-2016	27-Jun-2016	19-Jul-2016	26-Jul-2016	28-Jul-2016	19-Aug-2016	20-Aug-2016	22-Aug-2016
		ALS Sample ID		L1764338-7	L1790501-31	L1802460-2	L1806556-23	L1807078-3	L1816817-13	L1816829-7	L1818099-7
Physical Tests	Conductivity	umhos/cm	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	Hardness (as CaCO3)	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10
	pH	pH units	-	6.54	6.00	6.18	7.87	6.36	6.92	6.40	6.48
	Total Suspended Solids	mg/L	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids	mg/L	10	<10	<10	<20	<10	13	<10	<10	<10
	Turbidity	NTU	0.10	0.18	<0.10	<0.10	0.44	<0.10	0.23	0.16	<0.10
Anions and Nutrients	Alkalinity, Total (as CaCO3)	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10
	Ammonia, Total (as N)	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bromide (Br)	mg/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Nitrate and Nitrite as N	mg/L	0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
	Nitrate (as N)	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite (as N)	mg/L	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen	mg/L	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.29	<0.15
	Phosphorus, Total	mg/L	0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Sulfate (SO4)	mg/L	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon	Dissolved Organic Carbon	mg/L	1.0	1.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Organic Carbon	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Metals	Aluminum (Al)	mg/L	0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.000050	<0.000050	<0.000050	0.000380	0.000418	0.000061	<0.000050	<0.000050	<0.000050
	Beryllium (Be)	mg/L	0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	0.050	<0.050	<0.050	0.121	0.121	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)	mg/L	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Manganese (Mn)	mg/L	0.000070	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070	0.000099	<0.000070
	Mercury (Hg)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.050	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Selenium (Se)	mg/L	0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.050	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Silver (Ag)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Strontium (Sr)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Thallium (Tl)	mg/L	0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)	mg/L	0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)	mg/L	0.00060	0.00063	<0.0050	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00003 - 0.00005	0.000043	<0.00010	0.000367	0.000325	0.000054	<0.000050	0.000054	<0.000050
	Beryllium (Be)	mg/L	0.000010	<0.000010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	0.0000050	<0.0000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	0.020 - 0.050	<0.020	<0.050	0.128	0.124	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)	mg/L	0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0000050	<0.0000050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00050	<0.00010	<0.00020	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)	mg/L	0.0010	<0.0010	<0.010	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.0000090	<0.0000090	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	0.0050	<0.0050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Manganese (Mn)	mg/L	0.000070	<0.000070	<0.00050	<0.000070	<0.000070	<0.000070	0.000092	0.000154	<0.000070
	Mercury (Hg)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)	mg/L	0.000090	<0.000090	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)	mg/L	0.050	<0.050	<0.050						
	Potassium (K)	mg/L	0.050	<0.050	<0.050	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Selenium (Se)	mg/L	0.000040	<0.000040	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.050	<0.050	<0.050	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Silver (Ag)	mg/L	0.0000050	<0.0000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.020	<0.020	<0.50	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Strontium (Sr)	mg/L	0.000050	<0.000050	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Thallium (Tl)	mg/L	0.0000020	<0.0000020	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	0.000030	<0.000030	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	0.00030	<0.00050	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.0000070	<0.0000070	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)	mg/L	0.000050	<0.000050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.00050	<0.00050	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)	mg/L	0.00010	<0.00010	<0.00030						
Other	Phenols (4AAP)	mg/L	0.0010	0.0014	0.0048	0.0080	0.0040	0.0021	0.0047	0.0016	0.0023
	Chlorophyll a	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Phaeophytin a	ug/L	0.10	<0.13	0.19	0.19	0.20	0.22	0.11	0.16	0.19

Table A.3: Equipment blank results, CREMP 2016. Highlighted values did not meet the data quality objective of ≤ five-times the laboratory method detection limit (MDL).

	Client Sample ID		Lowest MDL[1]	DL0-02-4	JL0-10	JL0-02	DD-HAB-9-STN1	DD-HAB-9-STN1	BL0-05-A	BL0-03	REF3-02	BL0-01	BL0-09	BL0-03
	Date Sampled			29-Apr-2016	7-May-2016	24-Jul-2016	24-Jul-2016	25-Jul-2016	30-Jul-2016	30-Jul-2016	19-Aug-2016	21-Aug-2016	23-Aug-2016	24-Aug-2016
	ALS Sample ID			L1764338-3	L1766948-1	L1803150-10	L1803150-3	L1805153-1	L1807075-14	L1807075-7	L1816829-1	L1817107-1	L1820246-8	L1820248-3
Physical Tests	Conductivity	umhos/cm	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	Hardness (as CaCO3)	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Total Suspended Solids	mg/L	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids	mg/L	10	<10	<10	<20	<20	<10	<10	<10	<10	<10	<10	<10
	Turbidity	NTU	0.10	**1.42**	<0.10	0.33	0.11	0.40	<0.10	0.13	0.24	0.20	0.38	<0.10
Anions and Nutrients	Alkalinity, Total (as CaCO3)	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Ammonia, Total (as N)	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bromide (Br)	mg/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Nitrate and Nitrite as N	mg/L	0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
	Nitrate (as N)	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite (as N)	mg/L	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen	mg/L	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Phosphorus, Total	mg/L	0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0031
	Sulfate (SO4)	mg/L	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon	Dissolved Organic Carbon	mg/L	1.0	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Organic Carbon	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Metals	Aluminum (Al)-Total	mg/L	0.0030	<0.0030	<0.0030	0.00890	0.0036	<0.0030	<0.0030	0.0054	**0.0212**	0.0063	<0.0030	<0.0030
	Antimony (Sb)-Total	mg/L	0.00010	<0.00010	<0.00010	0.00017	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Total	mg/L	0.000050	0.000071	0.000218	**0.000534**	**0.000604**	**0.000939**	**0.000339**	**0.000373**	0.000221	0.000071	<0.000050	<0.000050
	Beryllium (Be)-Total	mg/L	0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)-Total	mg/L	0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total	mg/L	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total	mg/L	0.050	<0.050	0.084	0.188	0.151	0.158	0.127	0.060	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)-Total	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Total	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total	mg/L	0.00050	<0.00050	<0.00050	<0.00050	0.00075	0.00088	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)-Total	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total	mg/L	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total	mg/L	0.050	<0.050	<0.050	0.053000	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Manganese (Mn)-Total	mg/L	0.000070	<0.000070	<0.000070	0.000228	0.000164	0.000122	0.000075	0.000082	**0.000413**	0.000128	<0.000070	<0.000070
	Mercury (Hg)-Total	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Total	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)-Total	mg/L	0.050	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Selenium (Se)-Total	mg/L	0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Total	mg/L	0.050	<0.10	<0.10	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Silver (Ag)-Total	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	0.050	<0.050	<0.050	0.08100	0.15700	0.15400	<0.050	0.10400	0.073	<0.050	<0.050	0.067
	Strontium (Sr)-Total	mg/L	0.00010	<0.00010	<0.00010	0.00017	0.00020	0.00023	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
	Thallium (Tl)-Total	mg/L	0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Total	mg/L	0.00010	0.00012	0.00011	0.00014	0.0002	0.00029	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Total	mg/L	0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total	mg/L	0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	0.00060	0.00064	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.00003 - 0.00005	0.000169	**0.000312**	**0.000651**	**0.000591**	**0.000896**	**0.00085**	**0.000453**	**0.000312**	0.000128	0.000237	0.000067
	Beryllium (Be)-Dissolved	mg/L	0.000010	<0.000010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)-Dissolved	mg/L	0.0000050	<0.0000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved	mg/L	0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved	mg/L	0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved	mg/L	0.020 - 0.050	0.030	0.090	0.214	0.164	0.150	0.196	0.052	0.072	<0.050	<0.050	<0.050
	Chromium (Cr)-Dissolved	mg/L	0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved	mg/L	0.0000050	<0.0000050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved	mg/L	0.00050	<0.00010	<0.00050	<0.00050	0.0007	0.00078	<0.00050	<0.00050	0.00062	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Dissolved	mg/L	0.0010	<0.0010	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)-Dissolved	mg/L	0.0000090	<0.0000090	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved	mg/L	0.0050	0.0071	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Manganese (Mn)-Dissolved	mg/L	0.000070	<0.000070	0.000071	<0.000070	0.000082	0.000087	0.000107	<0.000070	0.000099	0.000114	<0.000070	<0.000070
	Mercury (Hg)-Dissolved	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved	mg/L	0.000090	<0.000090	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)-Dissolved	mg/L	0.050	<0.050	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Selenium (Se)-Dissolved	mg/L	0.000040	<0.000040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Dissolved	mg/L	0.050	<0.050	<0.10	<0.10	0.12	<0.10	0.16	<0.10	<0.10	<0.10	<0.10	<0.10
	Silver (Ag)-Dissolved	mg/L	0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	0.020 - 0.050	0.039	<0.050	0.08400	0.16100	0.15300	0.19600	0.10300	0.10900	<0.050	<0.050	0.067
	Strontium (Sr)-Dissolved	mg/L	0.000050	<0.000050	<0.00010	0.00018	0.00020	0.00022	0.00024	0.00011	0.00016	<0.00010	<0.00010	<0.00010
	Thallium (Tl)-Dissolved	mg/L	0.0000020	<0.0000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Dissolved	mg/L	0.00003 - 0.0001	<0.000030	0.00021	<0.00010	0.00019	0.00025	0.00033	0.00012	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	0.00030	<0.00050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0000070	<0.0000070	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Dissolved	mg/L	0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved	mg/L	0.00050 - 0.0030	0.00147	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0036	<0.0030	<0.0030
Other	Phenols (4AAP)	mg/L	0.0010	<0.0010	<0.0010	0.0040	0.0014	**0.0057**	0.0041	0.0014	0.0023	0.0022	0.0046	**0.0064**
	Chlorophyll a	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	**0.80**	<0.10
	Phaeophytin a	ug/L	0.10	0.13	0.18	0.22	0.19	0.17	0.18	0.20	0.17	0.23	**0.56**	0.18

[1] For some analytes, a range of MDLs were achieved in different laboratory reports. Each blank is compared to the MDL applicable to that sample.

and field blanks, which suggested that field sampling techniques may occasionally be a source of contamination in samples. Overall, the trip, field and equipment blank analyses indicated that barium and phenols results should be interpreted with caution, but otherwise analyses of these blanks suggested limited sample contamination for the majority of parameters.

A2.1.2 Precision – Field Duplicates

A total of 17 field duplicates were collected over the course of the 2016 Mary River Project CREMP. These included three winter lake monitoring events, two spring stream monitoring events, six summer stream/lake monitoring events, and six fall stream/lake monitoring events. In general, close agreement in parameter concentrations was observed between duplicate samples, with 95% of field duplicate analyte pairs meeting the DQO of ≤25% Relative Percent Difference (RPD) in parameter concentrations of the 1,477 duplicate analyses conducted (Table A.4). Total ammonia, total phosphorus, phenols, total aluminum and dissolved manganese were the key parameters which most frequently did not meet DQO between the duplicate samples (Table A.4). In approximately 45% of cases in which DQO were not met, measured concentrations in one or both duplicate samples were close to the MDL (i.e., two- to three-times the MDL) such that small differences in concentrations between duplicate samples resulted in relatively high RPD. For other parameters, the relatively high RPD between duplicate samples likely reflected natural variability in actual concentrations in the field or sampling related influences. However, in the majority of cases, and for key parameters of concern, the RDP in analyte concentrations was sufficiently low as to not affect interpretation of the data.

A2.2 Sediment Samples

A2.2.1 Data Precision – Field Duplicate Samples

Field duplicate sediment samples were collected at each of Camp Lake (Station JLO-02), Sheardown Lake NW (Station DLO-01-2), Mary Lake (BLO-06) and Reference Lake 3 (REF03-9), which represented 9% of the total number of sediment quality monitoring stations sampled for the 2016 CREMP. Good agreement in parameter concentrations were observed between duplicate samples, with only twelve incidences (4.2%) in which the DQO of greater than 40% RPD between duplicate samples was not achieved (Table A.5). Relatively high RPD for arsenic, barium, lead, manganese, molybdenum and/or tin were observed between the field duplicate samples collected from Camp Lake, Sheardown Lake NW and Reference Lake 3 (Table A.5). The relatively high RPD between

Figure A.4: Water sample field duplicate results. Highlighted values did not meet the DQO of ≤ 25% RPD. Higlighted and bold values did not meet the DQO and were calculated from values that were > 10-times the MDL.

	Sample ID	Lowest	MRY-REF2	MRY-REF201		CLT-REF4	CLT-REF401		REF3-02-S	REF3-02-S01	
	Date Sampled	Detection	27-Jun-16	27-Jun-16	RPD	24-Jul-16	24-Jul-16	RPD	28-Jul-16	28-Jul-16	RPD
	ALS Sample ID	Limit	L1790501-26	L1790501-32		L1803155-1	L1803155-2		L1806575-1	L1806575-3	
Conventionals	Conductivity (lab)	3.0	39.5	39.7	0.5	81.4	82.4	1.2	76.6	76.2	0.5
	Hardness (as $CaCO_3$)	10	18	18	0	39	39	0	35	35	0
	Total Suspended Solids (TSS)	2.0	<2.0	<2.0	0	<2.0	<2.0	0	<2.0	<2.0	0
	Total Dissolved Solids (TDS)	10	26	25	3.9	55	48	14	50	38	**27**
	Turbidity	0.10	0.67	0.66	1.5	2.35	2.70	14	0.25	0.25	0
	Alkalinity (as $CaCO_3$)	10	18	21	15	38	37	2.7	36	37	2.7
Nutrients and Organics	Total Ammonia	0.020	<0.020	0.028	33	<0.020	<0.020	0	<0.020	<0.020	0
	Nitrate	0.020	<0.020	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0
	Nitrite	0.0050	<0.0050	<0.0050	0	<0.0050	<0.0050	0	<0.0050	<0.0050	0
	Total Kjeldahl Nitrogen (TKN)	0.15	<0.15	<0.15	0	<0.15	<0.15	0	0.15	0.20	29
	Nitrate and Nitrite (as N)	0.021	<0.021	<0.021	0	<0.021	<0.021	0	<0.021	<0.021	0
	Dissolved Organic Carbon	1.0	1.1	1.1	0	<1.0	<1.0	0	2.6	2.7	3.8
	Total Organic Carbon	1.0	1.3	1.3	0	<1.0	<1.0	0	2.6	2.6	0
	Total Phosphorus	0.0030	0.0303	0.0042	151	0.0044	0.0040	9.5	0.0035	0.0040	13
	Phenols	0.0010	0.0044	0.0031	35	<0.0010	0.0015	40	0.0016	0.0026	48
Anions	Bromide (Br)	0.10	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
	Chloride (Cl)	0.50	0.58	0.57	1.7	<0.50	<0.50	0	1.28	1.89	38
	Sulphate (SO_4)	0.30	0.32	0.30	6.5	0.72	0.71	1.4	4.16	5.16	21
Total Metals	Aluminum (Al)	0.0030	0.0182	0.0177	2.8	0.0996	0.0698	**35**	<0.0030	<0.0030	0
	Antimony (Sb)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000050	0.00200	0.00201	0.5	0.00395	0.00374	5.5	0.00638	0.00678	6.1
	Beryllium (Be)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.010	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.050	3.69	3.74	1.3	8.01	8.06	0.6	6.96	7.13	2.4
	Cesium (Cs)	0.000010									
	Chromium (Cr)	0.00050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	0.00057	<0.00050	13
	Cobalt (Co)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	0.00079	0.00076	3.9
	Iron (Fe)	0.030	<0.030	<0.030	0	0.045	0.032	34	<0.030	<0.030	0
	Lead (Pb)	0.000050	<0.000050	<0.000050	0	0.000058	0.000052	11	<0.000050	<0.000050	0
	Lithium (Li)	0.0010	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.050	2.07	2.16	4.3	4.54	4.48	1.3	4.55	4.37	4.0
	Manganese (Mn)	0.000070	0.000617	0.000593	4.0	0.000551	0.000499	9.9	0.000677	0.000637	6.1
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	<0.000050	<0.000050	0	0.000115	0.000106	8.1	0.000124	0.000125	0.8
	Nickel (Ni)	0.00050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Phosphorus (P)	0.050									
	Potassium (K)	0.050	0.27	0.29	7.1	0.50	0.47	6.2	0.89	0.89	0
	Rubidium (Rb)	0.00020									
	Selenium (Se)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.33	0.34	3.0	0.84	0.76	10	0.43	0.45	4.5
	Silver (Ag)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.050	0.399	0.415	3.9	0.580	0.569	1.9	0.847	0.847	0
	Strontium (Sr)	0.00010	0.00283	0.00286	1.1	0.00617	0.00614	0.5	0.00780	0.00801	2.7
	Sulfur (S)	0.50									
	Tellurium (Te)	0.00020									
	Thallium (Tl)	0.000010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010									
	Tin (Sn)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Tungsten (W)	0.00010									
	Uranium (U)	0.000010	0.000189	0.000199	5.2	0.00137	0.00136	0.7	0.000247	0.000256	3.6
	Vanadium (V)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.0030	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00030									
Dissolved Metals	Aluminum (Al)	0.00050	0.0052	<0.00050	165	0.0117	0.0121	3.4	<0.0030	<0.0030	0
	Antimony (Sb)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000030	0.00190	0.00193	1.6	0.00352	0.00362	2.8	0.00656	0.00666	1.5
	Beryllium (Be)	0.000010	<0.00010	<0.00010	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.0000050	<0.000050	<0.000050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.0050	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.020	3.67	3.74	1.9	8.16	8.04	1.5	6.96	7.00	0.6
	Cesium (Cs)	0.000010	<0.000010	<0.000010	0						
	Chromium (Cr)	0.00010	<0.00050	0.0405	**195**	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.0000050	<0.00010	0.00012	18	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00020	0.00027	0.00313	168	<0.00050	<0.00050	0	0.00078	0.00076	2.6
	Iron (Fe)	0.0010	<0.010	0.891	**196**	<0.030	<0.030	0	<0.030	<0.030	0
	Lead (Pb)	0.0000090	<0.000050	<0.000050	0	<0.000050	<0.000050	0	0.000066	<0.00050	153
	Lithium (Li)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.0050	2.19	2.19	0	4.55	4.64	2.0	4.34	4.37	0.7
	Manganese (Mn)	0.000070	<0.00050	0.0109	**182**	0.000125	0.000078	46	0.000223	0.000283	24
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000055	0.000403	152	0.000119	0.000115	3.4	0.000127	0.000128	0.8
	Nickel (Ni)	0.000090	<0.00050	0.00162	106	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Phosphorus (P)	0.050	<0.050	<0.050	0						
	Potassium (K)	0.050	0.282	0.285	1.1	0.46	0.47	2.2	0.90	0.90	0
	Rubidium (Rb)	0.00020	0.00041	0.00043	4.8						
	Selenium (Se)	0.000040	<0.000050	<0.000050	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.311	0.323	3.8	0.63	0.65	3.1	0.43	0.43	0
	Silver (Ag)	0.0000050	<0.000050	<0.000050	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.020	<0.50	<0.50	0	0.579	0.594	2.6	0.850	0.848	0.2
	Strontium (Sr)	0.000050	0.0028	0.0028	0	0.00604	0.00610	1.0	0.00815	0.00799	2.0
	Sulfur (S)	0.50	<0.50	<0.50	0						
	Tellurium (Te)	0.00020	<0.00020	<0.00020	0						
	Thallium (Tl)	0.0000020	<0.000010	<0.000010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010	<0.00010	<0.00010	0						
	Tin (Sn)	0.000030	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.00030	<0.00030	0	<0.010	<0.010	0	<0.010	<0.010	0
	Tungsten (W)	0.00010	<0.00010	<0.00010	0						
	Uranium (U)	0.0000070	0.000185	0.000191	3.2	0.00133	0.00130	2.3	0.000255	0.000258	1.2
	Vanadium (V)	0.000050	<0.00050	<0.00050	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.00050	<0.0010	<0.0010	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00010	<0.00030	<0.00030	0						
Other	Chlorophyll a	0.10	0.44	0.45	2.2	0.38	0.43	12	0.95	0.94	1.1
	Phaeophytin a	0.10	0.44	0.46	4.4	0.45	0.41	9.3	0.7	0.57	20

Figure A.4: Water sample field duplicate results. Highlighted values did not meet the DQO of ≤ 25% RPD. Higlighted and bold values did not meet the DQO and were calculated from values that were > 10-times the MDL.

	Sample ID / Date Sampled / ALS Sample ID	Lowest Detection Limit	REF3-0101 / 20-Aug-16 / L1816829-4	REF3-01-S / 20-Aug-16 / L1816829-5	RPD	JL0-02 (S) / 23-Apr-16 / L1761245-1	JL0-0201 / 23-Apr-16 / L1761245-2	RPD	DL0-01-1(S) / 26-Apr-16 / L1762422-3	DL0-01-101 / 26-Apr-16 / L1762422-5	RPD
Conventionals	Conductivity (lab)	3.0	76.7	77.0	0.4	161	162	0.6	151	151	0
	Hardness (as $CaCO_3$)	10	35	35	0	81	80	1.2	73	71	2.8
	Total Suspended Solids (TSS)	2.0	<2.0	<2.0	0	<2.0	<2.0	0	<2.0	<2.0	0
	Total Dissolved Solids (TDS)	10	39	37	5.3	107	105	1.9	87	88	1.1
	Turbidity	0.10	0.32	0.44	32	0.17	0.21	21	0.26	0.26	0
	Alkalinity (as $CaCO_3$)	10	30	32	6.5	76	75	1.3	71	69	2.9
Nutrients and Organics	Total Ammonia	0.020	<0.020	<0.020	0	<0.020	0.026	26	<0.020	0.065	106
	Nitrate	0.020	<0.020	<0.020	0	<0.020	<0.020	0	0.033	0.034	3.0
	Nitrite	0.0050	<0.0050	<0.0050	0	<0.0050	<0.0050	0	<0.0050	<0.0050	0
	Total Kjeldahl Nitrogen (TKN)	0.15	<0.15	<0.15	0	<0.15	<0.15	0	0.18	0.17	5.7
	Nitrate and Nitrite (as N)	0.021	<0.021	<0.021	0	<0.021	<0.021	0	0.033	0.034	3.0
	Dissolved Organic Carbon	1.0	2.8	2.8	0	3.1	2.8	10	2.6	2.7	3.8
	Total Organic Carbon	1.0	2.9	2.8	3.5	2.1	2.0	4.9	2.2	2.0	9.5
	Total Phosphorus	0.0030	0.0043	0.0034	23	0.0031	<0.0030	3.3	0.0031	<0.0030	3.3
	Phenols	0.0010	0.0037	0.0027	31	0.0011	0.0023	71	<0.0010	<0.0010	0
Anions	Bromide (Br)	0.10	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
	Chloride (Cl)	0.50	1.27	1.27	0	4.22	4.29	1.6	3.51	3.51	0
	Sulphate (SO_4)	0.30	4.04	4.08	1.0	2.02	2.04	1.0	3.96	3.95	0.3
Total Metals	Aluminum (Al)	0.0030	0.0043	0.0035	21	0.0047	<0.0030	44	0.0100	0.0049	68
	Antimony (Sb)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000050	0.00657	0.00665	1.2	0.00732	0.00738	0.8	0.00676	0.00638	5.8
	Beryllium (Be)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.010	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.050	7.02	7.00	0.3	16.4	16.3	0.6	14.4	14.6	1.4
	Cesium (Cs)	0.000010									
	Chromium (Cr)	0.00050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	0.00085	52
	Cobalt (Co)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00050	0.00082	0.00083	1.2	0.00112	0.00129	14	0.00091	0.00099	8.4
	Iron (Fe)	0.030	<0.030	<0.030	0	<0.030	<0.030	0	<0.030	<0.030	0
	Lead (Pb)	0.000050	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
	Lithium (Li)	0.0010	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	0.0010	0
	Magnesium (Mg)	0.050	4.22	4.37	3.5	9.68	9.61	0.7	8.93	8.78	1.7
	Manganese (Mn)	0.000070	0.000566	0.000570	0.7	0.000426	0.000334	24	0.00176	0.00174	1.1
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000136	0.000130	4.5	0.000317	0.000327	3.1	0.000939	0.000950	1.2
	Nickel (Ni)	0.00050	<0.00050	<0.00050	0	0.00072	0.00065	10	0.00146	0.00232	46
	Phosphorus (P)	0.050									
	Potassium (K)	0.050	0.88	0.90	2.2	1.27	1.27	0	1.22	1.20	1.7
	Rubidium (Rb)	0.00020									
	Selenium (Se)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.39	0.40	2.5	0.42	0.42	0	0.64	0.66	3.1
	Silver (Ag)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.050	0.826	0.832	0.7	1.65	1.64	0.6	1.55	1.52	2.0
	Strontium (Sr)	0.00010	0.00811	0.00816	0.6	0.0115	0.0116	0.9	0.00974	0.00981	0.7
	Sulfur (S)	0.50									
	Tellurium (Te)	0.00020									
	Thallium (Tl)	0.000010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010									
	Tin (Sn)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	0.00024	0.00035	37
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Tungsten (W)	0.00010									
	Uranium (U)	0.000010	0.000285	0.000282	1.1	0.000931	0.000901	3.3	0.00115	0.00114	0.9
	Vanadium (V)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.0030	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00030									
Dissolved Metals	Aluminum (Al)	0.00050	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Antimony (Sb)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000030	0.00656	0.00630	4.0	0.00730	0.00729	0.1	0.00677	0.00661	2.4
	Beryllium (Be)	0.000010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.0000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.0050	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.020	7.12	6.92	2.8	16.5	16.1	2.5	14.0	14.2	1.4
	Cesium (Cs)	0.000010									
	Chromium (Cr)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.0000050	<0.00010	<0.00010	0	0.00012	<0.00010	18	<0.00010	<0.00010	0
	Copper (Cu)	0.00020	0.00090	0.00090	0	0.00133	0.00116	14	0.00086	0.00081	6.0
	Iron (Fe)	0.0010	<0.030	<0.030	0	<0.030	<0.030	0	<0.030	<0.030	0
	Lead (Pb)	0.0000090	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
	Lithium (Li)	0.00050	<0.0010	<0.0010	0	0.0010	0.0011	9.5	<0.0010	<0.0010	0
	Magnesium (Mg)	0.0050	4.27	4.38	2.5	9.64	9.67	0.3	9.13	8.67	5.2
	Manganese (Mn)	0.000070	0.000255	0.000244	4.4	0.00196	0.00274	**33**	0.000303	0.000215	34
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000133	0.000133	0	0.000506	0.000467	8.0	0.000920	0.000900	2.2
	Nickel (Ni)	0.000090	<0.00050	<0.00050	0	0.0121	0.00806	**40**	0.00099	0.00087	13
	Phosphorus (P)	0.050									
	Potassium (K)	0.050	0.88	0.89	1.1	1.28	1.28	0	1.10	1.09	0.9
	Rubidium (Rb)	0.00020									
	Selenium (Se)	0.000040	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.39	0.40	2.5	0.42	0.41	2.4	0.61	0.60	1.7
	Silver (Ag)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.020	0.827	0.840	1.6	1.88	1.91	1.6	1.50	1.42	5.5
	Strontium (Sr)	0.000050	0.00833	0.00805	3.4	0.0128	0.0124	3.2	0.00933	0.00917	1.7
	Sulfur (S)	0.50									
	Tellurium (Te)	0.00020									
	Thallium (Tl)	0.0000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010									
	Tin (Sn)	0.000030	<0.00010	<0.00010	0	0.00086	0.00113	**27**	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Tungsten (W)	0.00010									
	Uranium (U)	0.0000070	0.000282	0.000276	2.2	0.000916	0.000888	3.1	0.00111	0.00110	0.9
	Vanadium (V)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.00050	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00010									
Other	Chlorophyll a	0.10	0.59	0.63	6.6	0.69	0.56	21	0.89	0.87	2.3
	Phaeophytin a	0.10	0.41	0.5	20	<0.39	<0.39	0	0.85	0.58	38

Figure A.4: Water sample field duplicate results. Highlighted values did not meet the DQO of ≤ 25% RPD. Higlighted and bold values did not meet the DQO and were calculated from values that were > 10-times the MDL.

	Sample ID	Lowest Detection Limit	BL0-09-B	BL0-09-B01	RPD	C0-10	C0-1001	RPD	JL0-07-S	JL0-07-S01	RPD
	Date Sampled		6-May-16	6-May-16		25-Jun-16	25-Jun-16		26-Jul-16	26-Jul-16	
	ALS Sample ID		L1766933-4	L1766933-5		L1790501-3	L1790501-4		L1806556-25	L1806556-26	
Conventionals	Conductivity (lab)	3.0	82.6	82.7	0.1	19.9	20.0	0.5	132	132	0
	Hardness (as $CaCO_3$)	10	43	40	7.2	<10	<10	0	64	65	1.6
	Total Suspended Solids (TSS)	2.0	<2.0	<2.0	0	2.8	2.8	0	<2.0	<2.0	0
	Total Dissolved Solids (TDS)	10	45	44	2.2	<10	<10	0	76	74	2.7
	Turbidity	0.10	0.20	0.19	5.1	3.94	3.95	0.3	0.34	0.41	19
	Alkalinity (as $CaCO_3$)	10	41	40	2.5	11	12	8.7	65	66	1.5
Nutrients and Organics	Total Ammonia	0.020	<0.020	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0
	Nitrate	0.020	0.076	0.069	9.7	0.048	0.033	37	<0.020	<0.020	0
	Nitrite	0.0050	<0.0050	<0.0050	0	<0.0050	<0.0050	0	<0.0050	<0.0050	0
	Total Kjeldahl Nitrogen (TKN)	0.15	<0.15	0.16	6.5	<0.15	<0.15	0	<0.15	<0.15	0
	Nitrate and Nitrite (as N)	0.021	0.076	0.069	9.7	0.048	0.033	37	<0.021	<0.021	0
	Dissolved Organic Carbon	1.0	1.2	1.3	8.0	<1.0	<1.0	0	1.5	1.5	0
	Total Organic Carbon	1.0	1.4	1.5	6.9	1.1	<1.0	9.5	1.7	1.7	0
	Total Phosphorus	0.0030	0.0043	<0.0030	36	0.0072	0.0074	2.7	0.0035	<0.0030	15
	Phenols	0.0010	0.0014	0.0015	6.9	0.0017	0.0011	43	0.0037	0.0066	56
Anions	Bromide (Br)	0.10	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
	Chloride (Cl)	0.50	2.00	1.86	7.3	0.63	0.71	12	3.34	3.33	0.3
	Sulphate (SO_4)	0.30	1.03	1.01	2.0	0.45	0.43	4.5	1.98	1.98	0
Total Metals	Aluminum (Al)	0.0030	0.0065	0.0071	8.8	0.0907	0.0826	9.3	0.0059	0.0069	16
	Antimony (Sb)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000050	0.00486	0.00481	1.0	0.00202	0.00193	4.6	0.00639	0.00639	0
	Beryllium (Be)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.010	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.050	8.10	8.11	0.1	1.92	1.78	7.6	13.1	13.0	0.8
	Cesium (Cs)	0.000010									
	Chromium (Cr)	0.00050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00050	0.00066	0.00066	0	<0.00050	<0.00050	0	0.00076	0.00079	3.9
	Iron (Fe)	0.030	<0.030	<0.030	0	0.094	0.073	25	<0.030	<0.030	0
	Lead (Pb)	0.000050	<0.000050	<0.000050	0	0.000116	0.000093	22	<0.000050	<0.000050	0
	Lithium (Li)	0.0010	<0.0010	<0.0010	0	<0.0010	<0.0010	0	0.0012	0.0012	0
	Magnesium (Mg)	0.050	4.75	4.77	0.4	1.13	1.05	7.3	8.06	8.14	1.0
	Manganese (Mn)	0.000070	0.000786	0.000852	8.1	0.00263	0.00221	17	0.00273	0.00279	2.2
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000139	0.000147	5.6	<0.000050	<0.000050	0	0.000235	0.000241	2.5
	Nickel (Ni)	0.00050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	0.00054	0.00055	1.8
	Phosphorus (P)	0.050									
	Potassium (K)	0.050	0.62	0.62	0	0.23	0.22	4.4	1.01	1.03	2.0
	Rubidium (Rb)	0.00020									
	Selenium (Se)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.69	0.64	7.5	0.36	0.34	5.7	0.37	0.37	0
	Silver (Ag)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.050	1.28	1.23	4.0	0.373	0.345	7.8	1.36	1.43	5.0
	Strontium (Sr)	0.00010	0.00650	0.00644	0.9	0.00176	0.00168	4.7	0.00933	0.00927	0.6
	Sulfur (S)	0.50									
	Tellurium (Te)	0.00020									
	Thallium (Tl)	0.000010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010									
	Tin (Sn)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Tungsten (W)	0.00010									
	Uranium (U)	0.000010	0.000485	0.000517	6.4	0.000099	0.000094	5.2	0.000626	0.000640	2.2
	Vanadium (V)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.0030	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00030									
Dissolved Metals	Aluminum (Al)	0.00050	<0.0030	0.0035	15	0.0113	0.0107	5.5	<0.0030	0.0089	99
	Antimony (Sb)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000030	0.00471	0.00480	1.9	0.00140	0.00147	4.9	0.00615	0.00630	2.4
	Beryllium (Be)	0.000010	<0.00050	<0.00050	0	<0.00010	<0.00010	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.0000050	<0.00050	<0.00050	0	<0.000050	<0.000050	0	<0.00050	<0.00050	0
	Boron (B)	0.0050	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.020	8.73	8.17	6.6	1.75	1.73	1.1	12.7	12.9	1.6
	Cesium (Cs)	0.000010				<0.000010	<0.000010	0			
	Chromium (Cr)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.0000050	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00020	0.00077	0.00065	17	0.00027	0.00026	3.8	0.00076	0.00076	0
	Iron (Fe)	0.0010	<0.030	<0.030	0	<0.010	<0.010	0	<0.030	<0.030	0
	Lead (Pb)	0.0000090	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
	Lithium (Li)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.0050	5.15	4.77	7.7	1.07	1.05	1.9	7.95	7.93	0.3
	Manganese (Mn)	0.000070	0.000203	0.000245	19	0.00100	0.00092	8.3	0.000553	0.000846	42
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000163	0.000139	16	<0.000050	<0.000050	0	0.000247	0.000230	7.1
	Nickel (Ni)	0.000090	0.00061	<0.00050	20	<0.00050	<0.00050	0	0.00052	0.00058	11
	Phosphorus (P)	0.050				<0.050	<0.050	0			
	Potassium (K)	0.050	0.68	0.61	11	0.216	0.207	4.3	1.03	1.06	2.9
	Rubidium (Rb)	0.00020				0.00027	0.00028	3.6			
	Selenium (Se)	0.000040	<0.0010	<0.0010	0	<0.000050	<0.000050	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.35	0.62	56	0.224	0.226	0.9	0.35	0.36	2.8
	Silver (Ag)	0.0000050	<0.000010	<0.000010	0	<0.000050	<0.000050	0	<0.000010	<0.000010	0
	Sodium (Na)	0.020	1.20	1.19	0.8	<0.50	<0.50	0	1.34	1.34	0
	Strontium (Sr)	0.000050	0.00680	0.00647	5.0	0.0016	0.0016	0	0.00953	0.00956	0.3
	Sulfur (S)	0.50				<0.50	<0.50	0			
	Tellurium (Te)	0.00020				<0.00020	<0.00020	0			
	Thallium (Tl)	0.0000020	<0.00010	<0.00010	0	<0.000010	<0.000010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010				<0.00010	<0.00010	0			
	Tin (Sn)	0.000030	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.00030	<0.00030	0	<0.010	<0.010	0
	Tungsten (W)	0.00010				<0.00010	<0.00010	0			
	Uranium (U)	0.0000070	0.000696	0.000517	**30**	0.000069	0.000065	6.0	0.000651	0.000664	2.0
	Vanadium (V)	0.000050	<0.0010	<0.0010	0	<0.00050	<0.00050	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.00050	<0.0030	<0.0030	0	<0.0010	<0.0010	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00010				<0.00030	<0.00030	0			
Other	Chlorophyll a	0.10	0.17	<0.10	52	0.19	0.19	0	1.12	1.16	3.5
	Phaeophytin a	0.10	0.22	0.2	9.5	0.27	0.27	0	0.74	0.66	11

Figure A.4: Water sample field duplicate results. Highlighted values did not meet the DQO of ≤ 25% RPD. Higlighted and bold values did not meet the DQO and were calculated from values that were > 10-times the MDL.

	Sample ID / Date Sampled / ALS Sample ID	Lowest Detection Limit	DL0-02-8-B / 26-Jul-16 / L1806556-8	DL0-02-8-B01 / 26-Jul-16 / L1806556-9	RPD	BL0-01-B-B / 26-Jul-16 / L1806556-17	BL0-01-B-B01 / 26-Jul-16 / L1806556-18	RPD	E0-21 / 18-Jul-16 / L1800873-5	E0-2101 / 18-Jul-16 / L1800873-6	RPD
Conventionals	Conductivity (lab)	3.0	88.0	87.9	0.1	92.7	93.3	0.6	61.4	61.5	0.2
	Hardness (as $CaCO_3$)	10	42	42	0	45	45	0	27	27	0
	Total Suspended Solids (TSS)	2.0	10.4	8.4	21	<2.0	<2.0	0	<2.0	<2.0	0
	Total Dissolved Solids (TDS)	10	46	56	20	48	47	2.1	30	30	0
	Turbidity	0.10	6.33	5.70	10	1.01	9.11	**160**	7.46	7.47	0.1
	Alkalinity (as $CaCO_3$)	10	43	42	2.4	48	51	6.1	41	33	22
Nutrients and Organics	Total Ammonia	0.020	<0.020	0.047	81	<0.020	<0.020	0	<0.020	<0.020	0
	Nitrate	0.020	<0.020	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0
	Nitrite	0.0050	<0.0050	<0.0050	0	<0.0050	<0.0050	0	<0.0050	<0.0050	0
	Total Kjeldahl Nitrogen (TKN)	0.15	<0.15	<0.15	0	<0.15	<0.15	0	<0.15	0.55	114
	Nitrate and Nitrite (as N)	0.021	<0.021	<0.021	0	<0.021	<0.021	0	<0.021	<0.021	0
	Dissolved Organic Carbon	1.0	1.1	1.3	17	<1.0	<1.0	0	<1.0	<1.0	0
	Total Organic Carbon	1.0	1.5	1.5	0	1.0	1.1	9.5	<1.0	<1.0	0
	Total Phosphorus	0.0030	0.0192	0.0156	21	0.0050	0.0059	17	0.0064	0.0060	6.5
	Phenols	0.0010	0.0020	0.0011	58	0.0031	0.0037	18	0.0012	0.0017	34
Anions	Bromide (Br)	0.10	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
	Chloride (Cl)	0.50	1.69	1.71	1.2	1.22	1.18	3.3	1.03	1.03	0
	Sulphate (SO_4)	0.30	1.64	1.64	0	0.66	0.60	9.5	0.88	0.88	0
Total Metals	Aluminum (Al)	0.0030	0.146	0.152	4.0	0.0396	0.0250	**45**	0.254	0.249	2.0
	Antimony (Sb)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000050	0.00638	0.00629	1.4	0.00522	0.00535	2.5	0.00555	0.00594	6.8
	Beryllium (Be)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.010	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.050	8.46	8.73	3.1	9.40	9.12	3.0	5.70	5.81	1.9
	Cesium (Cs)	0.000010									
	Chromium (Cr)	0.00050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.00010	0.00011	<0.00010	9.5	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00050	0.00089	0.00089	0	0.00058	0.00059	1.7	0.00070	0.00068	2.9
	Iron (Fe)	0.030	0.173	0.175	1.1	0.035	<0.030	15	0.158	0.161	1.9
	Lead (Pb)	0.000050	0.000238	0.000238	0	<0.000050	<0.000050	0	0.000193	0.000173	11
	Lithium (Li)	0.0010	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.050	5.35	5.31	0.8	5.51	5.73	3.9	3.24	3.21	0.9
	Manganese (Mn)	0.000070	0.00659	0.00660	0.2	0.00232	0.00231	0.4	0.00168	0.00182	8.0
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000207	0.000236	13	0.000102	0.000094	8.2	0.000171	0.000182	6.2
	Nickel (Ni)	0.00050	0.00051	0.00053	3.8	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Phosphorus (P)	0.050									
	Potassium (K)	0.050	0.77	0.77	0	0.57	0.57	0	0.67	0.67	0
	Rubidium (Rb)	0.00020									
	Selenium (Se)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.67	0.69	2.9	0.66	0.63	4.7	1.00	1.01	1.0
	Silver (Ag)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.050	0.953	0.954	0.1	0.954	0.973	2.0	0.884	0.874	1.1
	Strontium (Sr)	0.00010	0.00640	0.00661	3.2	0.00614	0.00596	3.0	0.00611	0.00606	0.8
	Sulfur (S)	0.50									
	Tellurium (Te)	0.00020									
	Thallium (Tl)	0.000010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010									
	Tin (Sn)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0	0.010	<0.010	0
	Tungsten (W)	0.00010									
	Uranium (U)	0.000010	0.000680	0.000681	0.1	0.000578	0.000560	3.2	0.000437	0.000428	2.1
	Vanadium (V)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.0030	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00030									
Dissolved Metals	Aluminum (Al)	0.00050	0.0090	0.0090	0	0.0052	0.0049	5.9	0.0217	0.0269	21
	Antimony (Sb)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000030	0.00486	0.00479	1.5	0.00502	0.00488	2.8	0.00400	0.00431	7.5
	Beryllium (Be)	0.000010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.0000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.0050	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.020	8.48	8.37	1.3	9.03	9.10	0.8	5.68	5.74	1.1
	Cesium (Cs)	0.000010									
	Chromium (Cr)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.0000050	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00020	0.00058	0.00056	3.5	0.00056	0.00055	1.8	<0.00050	<0.00050	0
	Iron (Fe)	0.0010	<0.030	<0.030	0	<0.030	<0.030	0	<0.030	<0.030	0
	Lead (Pb)	0.0000090	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
	Lithium (Li)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.0050	5.06	5.08	0.4	5.36	5.43	1.3	3.14	3.14	0
	Manganese (Mn)	0.000070	0.000360	0.000390	8.0	0.00113	0.00114	0.9	0.000141	0.000148	4.8
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000306	0.000316	3.2	0.000106	0.000098	7.8	0.000178	0.000185	3.9
	Nickel (Ni)	0.000090	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Phosphorus (P)	0.050									
	Potassium (K)	0.050	0.72	0.72	0	0.57	0.57	0	0.57	0.57	0
	Rubidium (Rb)	0.00020									
	Selenium (Se)	0.000040	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.46	0.45	2.2	0.57	0.57	0	0.48	0.49	2.1
	Silver (Ag)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.020	0.951	0.960	0.9	0.967	0.971	0.4	0.865	0.858	0.8
	Strontium (Sr)	0.000050	0.00633	0.00629	0.6	0.00616	0.00589	4.5	0.00572	0.00576	0.7
	Sulfur (S)	0.50									
	Tellurium (Te)	0.00020									
	Thallium (Tl)	0.0000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010									
	Tin (Sn)	0.000030	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Tungsten (W)	0.00010									
	Uranium (U)	0.0000070	0.000583	0.000576	1.2	0.000540	0.000565	4.5	0.000373	0.000376	0.8
	Vanadium (V)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.00050	<0.0030	0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00010									
Other	Chlorophyll a	0.10	1.63	1.5900	2.5	1.08	1.07	0.9	0.27	0.25	7.7
	Phaeophytin a	0.10	0.72	0.6700	7.2	0.7	0.74	5.6	0.41	0.41	0

Figure A.4: Water sample field duplicate results. Highlighted values did not meet the DQO of ≤ 25% RPD. Higlighted and bold values did not meet the DQO and were calculated from values that were > 10-times the MDL.

	Sample ID	Lowest	JL0-0101	JL0-01-B		J0-01	J0-0101		DL0-02-07-B	DL0-02-0701	
	Date Sampled	Detection	22-Aug-16	22-Aug-16	RPD	20-Aug-16	20-Aug-16	RPD	21-Aug-16	21-Aug-16	RPD
	ALS Sample ID	Limit	L1818109-1	L1818109-3		L1816817-18	L1816817-19		L1817109-8	L1817109-9	
Conventionals	Conductivity (lab)	3.0	132	134	1.5	137	137	0	116	116	0
	Hardness (as $CaCO_3$)	10	62	63	1.6	66	67	1.5	54	55	1.8
	Total Suspended Solids (TSS)	2.0	<2.0	<2.0	0	<2.0	<2.0	0	2.5	<2.0	22
	Total Dissolved Solids (TDS)	10	65	62	4.7	64	70	9.0	61	53	14
	Turbidity	0.10	0.92	0.95	3.2	0.34	0.45	28	2.15	2.16	0.5
	Alkalinity (as $CaCO_3$)	10	64	62	3.2	64	63	1.6	52	55	5.6
Nutrients and Organics	Total Ammonia	0.020	0.022	0.054	84	<0.020	<0.020	0	<0.020	0.038	62
	Nitrate	0.020	<0.020	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0
	Nitrite	0.0050	<0.0050	<0.0050	0	<0.0050	<0.0050	0	<0.0050	<0.0050	0
	Total Kjeldahl Nitrogen (TKN)	0.15	<0.15	<0.15	0	<0.15	<0.15	0	<0.15	<0.15	0
	Nitrate and Nitrite (as N)	0.021	<0.021	<0.021	0	<0.021	<0.021	0	<0.021	<0.021	0
	Dissolved Organic Carbon	1.0	1.5	1.5	0	1.7	1.7	0	1.5	1.5	0
	Total Organic Carbon	1.0	1.6	1.7	6.1	1.9	2.0	5.1	1.7	2.2	26
	Total Phosphorus	0.0030	0.0042	0.0043	2.4	0.0048	<0.0030	46	0.0280	0.0062	127
	Phenols	0.0010	0.0014	0.0015	6.9	0.0043	0.0033	26	0.0027	0.0022	20
Anions	Bromide (Br)	0.10	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
	Chloride (Cl)	0.50	3.34	3.33	0.3	3.44	3.50	1.7	2.22	2.20	0.9
	Sulphate (SO_4)	0.30	2.01	2.03	1.0	2.18	2.20	0.9	2.65	2.62	1.1
Total Metals	Aluminum (Al)	0.0030	0.0041	0.0036	13	0.0047	0.0046	2.2	0.058	0.048	19
	Antimony (Sb)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000050	0.00598	0.00608	1.7	0.00663	0.00663	0	0.00634	0.00617	2.7
	Beryllium (Be)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00010	<0.00010	0
	Bismuth (Bi)	0.000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.000050	<0.000050	0
	Boron (B)	0.010	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.050	13.0	12.7	2.3	13.2	13.3	0.8	11.3	10.9	3.6
	Cesium (Cs)	0.000010							<0.000010	<0.000010	0
	Chromium (Cr)	0.00050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00050	0.00077	0.00076	1.3	0.00081	0.00082	1.2	0.0016	<0.0010	46
	Iron (Fe)	0.030	<0.030	<0.030	0	0.063	0.125	66	0.056	0.050	11
	Lead (Pb)	0.000050	<0.000050	<0.000050	0	<0.000050	<0.000050	0	0.00010	<0.00010	0
	Lithium (Li)	0.0010	0.0012	0.0012	0	0.0011	0.0011	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.050	7.53	7.54	0.1	8.21	8.23	0.2	6.47	6.22	3.9
	Manganese (Mn)	0.000070	0.00184	0.00175	5.0	0.00240	0.00314	**27**	0.00389	0.00350	11
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000245	0.000247	0.8	0.000268	0.000262	2.3	0.000520	0.000491	5.7
	Nickel (Ni)	0.00050	0.00055	0.00059	7.0	0.00069	0.00076	9.7	0.00083	0.00065	24
	Phosphorus (P)	0.050							<0.050	<0.050	0
	Potassium (K)	0.050	1.02	1.02	0	1.04	1.05	1.0	0.938	0.894	4.8
	Rubidium (Rb)	0.00020							0.00222	0.00212	4.6
	Selenium (Se)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.000050	<0.000050	0
	Silicon (Si)	0.050	0.35	0.36	2.8	0.38	0.38	0	0.619	0.608	1.8
	Silver (Ag)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000050	<0.000050	0
	Sodium (Na)	0.050	1.31	1.29	1.5	1.37	1.34	2.2	1.15	1.11	3.5
	Strontium (Sr)	0.00010	0.00977	0.00956	2.2	0.00975	0.00977	0.2	0.0087	0.0083	4.7
	Sulfur (S)	0.50							1.17	1.08	8.0
	Tellurium (Te)	0.00020							<0.00020	<0.00020	0
	Thallium (Tl)	0.000010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.000010	<0.000010	0
	Thorium (Th)	0.00010							<0.00010	<0.00010	0
	Tin (Sn)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0	0.00235	0.00191	21
	Tungsten (W)	0.00010							<0.00010	<0.00010	0
	Uranium (U)	0.000010	0.000696	0.000685	1.6	0.000788	0.000776	1.5	0.000821	0.000785	4.5
	Vanadium (V)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.00050	<0.00050	0
	Zinc (Zn)	0.0030	<0.0030	<0.0030	0	<0.0030	<0.0030	0	0.0044	<0.0030	38
	Zirconium (Zr)	0.00030							<0.00030	<0.00030	0
Dissolved Metals	Aluminum (Al)	0.00050	0.0040	<0.0030	29	<0.0030	<0.0030	0	0.0094	0.0085	10
	Antimony (Sb)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000030	0.00694	0.00619	11	0.00639	0.00681	6.4	0.00593	0.00599	1.0
	Beryllium (Be)	0.000010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.0000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.0050	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.020	12.5	12.7	1.6	13.3	13.4	0.7	11.0	11.1	0.9
	Cesium (Cs)	0.000010									
	Chromium (Cr)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.0000050	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00020	0.00076	0.00070	8.2	0.00079	0.00078	1.3	0.00081	0.00078	3.8
	Iron (Fe)	0.0010	<0.030	<0.030	0	<0.030	<0.030	0	<0.030	<0.030	0
	Lead (Pb)	0.0000090	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
	Lithium (Li)	0.00050	0.0010	0.0011	9.5	0.0011	0.0011	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.0050	7.48	7.52	0.5	7.99	8.08	1.1	6.42	6.70	4.3
	Manganese (Mn)	0.000070	0.000172	0.000096	57	0.00114	0.00101	12	0.000427	0.000356	18
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000238	0.000237	0.4	0.000277	0.000275	0.7	0.000486	0.000455	6.6
	Nickel (Ni)	0.000090	0.00055	0.00055	0	0.00064	0.00057	12	<0.00050	<0.00050	0
	Phosphorus (P)	0.050									
	Potassium (K)	0.050	1.03	1.01	2.0	1.08	1.06	1.9	0.91	0.90	1.1
	Rubidium (Rb)	0.00020									
	Selenium (Se)	0.000040	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.35	0.35	0	0.36	0.36	0	0.54	0.55	1.8
	Silver (Ag)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.020	1.32	1.32	0	1.39	1.35	2.9	1.17	1.19	1.7
	Strontium (Sr)	0.000050	0.00942	0.00951	1.0	0.00977	0.00983	0.6	0.00815	0.00819	0.5
	Sulfur (S)	0.50									
	Tellurium (Te)	0.00020									
	Thallium (Tl)	0.0000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010									
	Tin (Sn)	0.000030	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
	Tungsten (W)	0.00010									
	Uranium (U)	0.0000070	0.000701	0.000681	2.9	0.000776	0.000766	1.3	0.000830	0.000810	2.4
	Vanadium (V)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.00050	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00010									
Other	Chlorophyll a	0.10	1.67	1.72	2.9	0.71	0.6	17	3.61	3.55	1.7
	Phaeophytin a	0.10	0.84	0.85	1.2	0.39	0.36	8.0	0.92	0.87	5.6

Figure A.4: Water sample field duplicate results. Highlighted values did not meet the DQO of ≤ 25% RPD. Higlighted and bold values did not meet the DQO and were calculated from values that were > 10-times the MDL.

	Sample ID	Lowest	G0-03	G0-0301		BL0-04-S	BL0-0401	
	Date Sampled	Detection	20-Aug-16	20-Aug-16	RPD	23-Aug-16	23-Aug-16	RPD
	ALS Sample ID	Limit	L1816817-24	L1816817-32		L1820246-1	L1820246-3	
Conventionals	Conductivity (lab)	3.0	169	168	0.6	75.8	75.8	0
	Hardness (as $CaCO_3$)	10	76	75	1.3	35	35	0
	Total Suspended Solids (TSS)	2.0	3.0	2.9	3.4	<2.0	<2.0	0
	Total Dissolved Solids (TDS)	10	94	95	1.1	38	43	12
	Turbidity	0.10	12.0	12.5	4.1	1.67	1.63	2.4
	Alkalinity (as $CaCO_3$)	10	74	73	1.4	32	33	3.1
Nutrients and Organics	Total Ammonia	0.020	<0.020	<0.020	0	<0.020	<0.020	0
	Nitrate	0.020	<0.020	<0.020	0	<0.020	<0.020	0
	Nitrite	0.0050	<0.0050	<0.0050	0	<0.0050	<0.0050	0
	Total Kjeldahl Nitrogen (TKN)	0.15	<0.15	<0.15	0	<0.15	<0.15	0
	Nitrate and Nitrite (as N)	0.021	<0.021	<0.021	0	<0.021	<0.021	0
	Dissolved Organic Carbon	1.0	1.2	1.3	8.0	1.3	1.2	8.0
	Total Organic Carbon	1.0	1.5	1.5	0	1.4	1.2	15
	Total Phosphorus	0.0030	0.0094	0.0083	12	0.0069	0.0063	9.1
	Phenols	0.0010	0.0034	0.0062	58	0.0021	0.0047	76
Anions	Bromide (Br)	0.10	<0.10	<0.10	0	<0.10	<0.10	0
	Chloride (Cl)	0.50	6.98	7.01	0.4	1.38	1.44	4.3
	Sulphate (SO_4)	0.30	3.78	3.76	0.5	1.01	1.01	0
Total Metals	Aluminum (Al)	0.0030	0.292	0.290	0.7	0.0489	0.0537	9.4
	Antimony (Sb)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.00010	0.00011	0.00011	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000050	0.0127	0.0125	1.6	0.00474	0.00451	5.0
	Beryllium (Be)	0.00010	<0.00010	<0.00010	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.000050	<0.000050	<0.000050	0	<0.00050	<0.00050	0
	Boron (B)	0.010	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.050	15.6	15.8	1.3	7.30	7.19	1.5
	Cesium (Cs)	0.000010	0.000044	0.000046	4.4			
	Chromium (Cr)	0.00050	0.00074	0.00072	2.7	<0.00050	<0.00050	0
	Cobalt (Co)	0.00010	0.00015	0.00015	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00050	0.0015	0.0015	0	0.00165	0.00135	20
	Iron (Fe)	0.030	0.295	0.301	2.0	0.040	0.044	9.5
	Lead (Pb)	0.000050	0.00028	0.00030	6.9	0.000051	<0.000050	2.0
	Lithium (Li)	0.0010	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.050	8.90	8.81	1.0	4.32	4.33	0.2
	Manganese (Mn)	0.000070	0.00362	0.00367	1.4	0.00116	0.00110	5.3
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000420	0.000431	2.6	0.000135	0.000139	2.9
	Nickel (Ni)	0.00050	0.00074	0.00072	2.7	<0.00050	<0.00050	0
	Phosphorus (P)	0.050	<0.050	<0.050	0			
	Potassium (K)	0.050	1.34	1.34	0	0.60	0.60	0
	Rubidium (Rb)	0.00020	0.00265	0.00259	2.3			
	Selenium (Se)	0.000050	<0.000050	<0.000050	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	1.34	1.32	1.5	0.58	0.62	6.7
	Silver (Ag)	0.000010	<0.000050	<0.000050	0	<0.000010	<0.000010	0
	Sodium (Na)	0.050	3.73	3.69	1.1	1.01	1.02	1.0
	Strontium (Sr)	0.00010	0.0181	0.0177	2.2	0.00596	0.00583	2.2
	Sulfur (S)	0.50	1.36	1.33	2.2			
	Tellurium (Te)	0.00020	<0.00020	<0.00020	0			
	Thallium (Tl)	0.000010	0.000011	0.000010	9.5	<0.00010	<0.00010	0
	Thorium (Th)	0.00010	0.00043	0.00043	0			
	Tin (Sn)	0.00010	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	0.0158	0.0165	4.3	<0.010	<0.010	0
	Tungsten (W)	0.00010	<0.00010	<0.00010	0			
	Uranium (U)	0.000010	0.00456	0.00465	2.0	0.000577	0.000580	0.5
	Vanadium (V)	0.00050	0.00072	0.00075	4.1	<0.0010	<0.0010	0
	Zinc (Zn)	0.0030	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00030	0.00062	0.00063	1.6			
Dissolved Metals	Aluminum (Al)	0.00050	0.0086	0.0074	15	0.0084	0.0100	17
	Antimony (Sb)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Arsenic (As)	0.000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Barium (Ba)	0.000030	0.0106	0.0104	1.9	0.00421	0.00427	1.4
	Beryllium (Be)	0.000010	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Bismuth (Bi)	0.0000050	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Boron (B)	0.0050	<0.010	<0.010	0	<0.010	<0.010	0
	Cadmium (Cd)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Calcium (Ca)	0.020	15.8	15.8	0	7.20	7.15	0.7
	Cesium (Cs)	0.000010						
	Chromium (Cr)	0.00010	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Cobalt (Co)	0.0000050	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Copper (Cu)	0.00020	0.00088	0.00093	5.5	0.00199	0.00275	**32**
	Iron (Fe)	0.0010	<0.030	<0.030	0	<0.030	<0.030	0
	Lead (Pb)	0.0000090	<0.000050	<0.000050	0	<0.000050	<0.000050	0
	Lithium (Li)	0.00050	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Magnesium (Mg)	0.0050	8.88	8.74	1.6	4.22	4.24	0.5
	Manganese (Mn)	0.000070	0.000131	0.000131	0	0.000172	0.000205	18
	Mercury (Hg)	0.000010	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Molybdenum (Mo)	0.000050	0.000412	0.000420	1.9	0.000135	0.000132	2.2
	Nickel (Ni)	0.000090	<0.00050	<0.00050	0	<0.00050	<0.00050	0
	Phosphorus (P)	0.050						
	Potassium (K)	0.050	1.20	1.21	0.8	0.58	0.58	0
	Rubidium (Rb)	0.00020						
	Selenium (Se)	0.000040	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Silicon (Si)	0.050	0.87	0.87	0	0.49	0.50	2.0
	Silver (Ag)	0.0000050	<0.000010	<0.000010	0	<0.000010	<0.000010	0
	Sodium (Na)	0.020	3.76	3.63	3.5	1.00	1.00	0
	Strontium (Sr)	0.000050	0.0167	0.0167	0	0.00591	0.00603	2.0
	Sulfur (S)	0.50						
	Tellurium (Te)	0.00020						
	Thallium (Tl)	0.0000020	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Thorium (Th)	0.00010						
	Tin (Sn)	0.000030	<0.00010	<0.00010	0	<0.00010	<0.00010	0
	Titanium (Ti)	0.00030	<0.010	<0.010	0	<0.010	<0.010	0
	Tungsten (W)	0.00010						
	Uranium (U)	0.0000070	0.00423	0.00433	2.3	0.000564	0.000540	4.3
	Vanadium (V)	0.000050	<0.0010	<0.0010	0	<0.0010	<0.0010	0
	Zinc (Zn)	0.00050	<0.0030	<0.0030	0	<0.0030	<0.0030	0
	Zirconium (Zr)	0.00010						
Other	Chlorophyll a	0.10	0.22	0.24	8.7	1.02	0.71	**36**
	Phaeophytin a	0.10	0.37	0.4	7.8	0.49	0.5	2.0

Figure A.5: Sediment sample field duplicate results. Highlighted values did not meet the data quality objective of ≤ 40% Relative Percent Difference (RPD).

Parameter	Lowest Detection Limit	Units	REF-03-9	REF-03-DUP	% RPD	JLO-02	JLO-DUP	% RPD	DLO-01-02	DLO-01-DUP	% RPD	BLO-06	BLO-DUP	% RPD
			16-Aug-2016	16-Aug-2016		11-Sep-2016	11-Sep-2016		13-Aug-2016	13-Aug-2016		15-Aug-2016	15-Aug-2016	
Total Organic Carbon	0.10	%	4.46	4.36	2	3.03	3.68	19	1.90	1.93	2	1.23	1.06	15
Aluminum (Al)	50	µg/g	22,600	21,100	7	19,800	14,200	33	19,700	17,400	12	25,700	25,300	2
Antimony (Sb)	0.10	µg/g	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	0.10	0	<0.10	<0.10	0
Arsenic (As)	0.10	µg/g	5.64	6.24	10	12.1	7.2	51	4.41	4.05	9	3.95	3.91	1
Barium (Ba)	0.50	µg/g	148	179	19	155.0	184	17	86.4	130.0	40	105.0	107.0	2
Beryllium (Be)	0.10	µg/g	0.94	0.87	8	0.87	0.91	4	1.02	0.88	15	1.38	1.33	4
Bismuth (Bi)	0.20	µg/g	<0.20	<0.20	0	0.27	0.30	11	0.23	0.23	0	0.25	0.24	4
Boron (B)	5.0	µg/g	17.0	17.3	2	20.9	24.1	14	30.0	23.9	23	39.5	33.5	16
Cadmium (Cd)	0.020	µg/g	0.161	0.194	19	0.249	0.284	13	0.215	0.267	22	0.140	0.139	1
Calcium (Ca)	50	µg/g	5,640	5,710	1	4,340	5,460	23	4,570	4,320	6	4,900	4,600	6
Chromium (Cr)	0.50	µg/g	74.6	68.1	9	80.9	63.7	24	73.7	67.7	8	89.2	85.7	4
Cobalt (Co)	0.10	µg/g	16.3	18.4	12	23.3	18.4	24	15.4	15.4	0	17.2	17.2	0
Copper (Cu)	0.50	µg/g	92.8	83.6	10	51.4	45.3	13	41.7	38.5	8	33.9	34.2	1
Iron (Fe)	50	µg/g	46,800	61,000	26	54,100	44,000	21	37,300	35,500	5	42,100	41,800	1
Lead (Pb)	0.50	µg/g	21.4	33.3	44	19.9	21.2	6	22.3	53.2	82	35.0	37.4	7
Lithium (Li)	2.0	µg/g	39.2	37.4	5	27.6	30.1	9	35.9	32.1	11	51.9	51.1	2
Magnesium (Mg)	20	µg/g	15,000	13,400	11	15,800	12,300	25	12,800	11,300	12	16,800	17,000	1
Manganese (Mn)	1.0	µg/g	1,090	6,010	139	1,530	3,550	80	1,140	4,480	119	745	693	7
Mercury (Hg)	0.0050	µg/g	0.0703	0.0770	9	0.0414	0.0501	19	0.0342	0.0341	0	0.0524	0.0513	2
Molybdenum (Mo)	0.10	µg/g	2.41	6.57	93	1.55	2.48	46	2.72	8.79	105	0.92	0.80	14
Nickel (Ni)	0.50	µg/g	51.7	50.0	3	87.8	74	18	67.4	70.6	5	60.1	60.0	0
Phosphorus (P)	50	µg/g	972	1,060	9	1,870	1,290	37	881	789	11	751	782	4
Potassium (K)	100	µg/g	5,520	4,990	10	4,380	3,730	16	4,890	4,380	11	6,490	6,240	4
Selenium (Se)	0.20	µg/g	0.82	0.92	11	0.40	0.46	14	0.36	0.33	9	0.24	0.22	9
Silver (Ag)	0.10	µg/g	0.26	0.22	17	0.11	0.11	0	0.13	0.13	0	0.14	0.13	7
Sodium (Na)	50	µg/g	430	382	12	210	169	22	294	249	17	395	384	3
Strontium (Sr)	0.50	µg/g	14.7	14.8	1	8.7	10.2	16	11.9	10.2	15	15.9	14.6	9
Sulfur (S)	5000	µg/g	<5,000	<5,000	0	<5,000	<5,000	0	<5,000	<5,000	0	<5,000	<5,000	0
Thallium (Tl)	0.050	µg/g	0.754	0.789	5	0.485	0.622	25	0.543	0.595	9	0.647	0.632	2
Tin (Sn)	2.0	µg/g	6.6	23.7	113	3	<2.0	40	3.1	49.2	176	17.7	23.1	26
Titanium (Ti)	1.0	µg/g	1,210	1,200	1	1,070	800	29	1,240	1,040	18	1,680	1,640	2
Uranium (U)	0.050	µg/g	23.0	22.6	2	6.05	7.90	27	6.47	6.10	6	10.70	9.46	12
Vanadium (V)	0.20	µg/g	65.8	60.9	8	67.8	51.7	27	57.3	51.0	12	70.2	69.3	1
Zinc (Zn)	2.0	µg/g	94.7	87.7	8	67.0	54.3	21	67.1	63.2	6	85.3	84.6	1
Zirconium (Zr)	1.0	µg/g	4.3	3.1	32	5.6	6.7	18	4.4	5.4	20	24.8	24.2	2

duplicate samples for these parameters potentially reflected a combination of naturally high spatial variability of these parameters in lake sediments and/or inadequate sediment sample homogenization in the field and/or during laboratory sample preparation. Concentrations of lead, manganese, molybdenum and tin exhibited the highest between-duplicate variability (i.e., RPD), including those collected at Reference Lake 3, and therefore results for these parameters should take this variability into account during data interpretation. For all other metals, data precision was high and considered acceptable for providing reliable interpretation of the sediment quality data.

A2.3 Benthic Invertebrate Community Samples

A2.3.1 Subsampling Accuracy

Sub-sampling of benthic invertebrate community samples was conducted on 27 of 68 stream samples (40%) and 12 of 31 lake samples (39%; total of 39%) with the sorted fraction for these samples ranging between 12.5% (1/8) to 50% (1/2) of the sample material (Table A.8). Sub-sampling error estimates indicated that, on average, precision and accuracy of the sub-sampled benthic invertebrate community samples met the DQO of ≤ 20% (Table A.6). Only one of the six paired sub-sample comparisons resulted in precision and accuracy outside of the DQO for the quartered sample (Table A.6), but on average for this sample, and all others, precision and accuracy achieved the DQO of ≤ 20%. Overall, this indicated that precision and accuracy for sub-sampling of the benthic invertebrate community samples was acceptable.

A2.3.2 Organism Recovery

Sorting efficiency (i.e., percent recovery) of benthic invertebrate samples was high, averaging 98% for each of the eight lotic and three lentic samples evaluated (Table A.7a,b). Sorting efficiency for these samples achieved the DQO of ≥ 90% recovery, and therefore the benthic invertebrate community sample recovery was considered acceptable.

Table A.6: Subsampling error for benthic macroinvertebrate samples, Mary River Project CREMP, 2016.

a) Lotic (creek and river) samples

Station	Whole Organisms	Number of Organisms in Fraction 1	Number of Organisms in Fraction 2	Number of Organisms in Fraction 3	Number of Organisms in Fraction 4	Actual Density*	Precision		Accuracy	
							% range		min	max
CLT1-US-B2	19	109	130	-	-	239	16.2	-	8.8	-
CLT1-US-B5	24	175	185	-	-	360	5.4	-	2.8	-
SDLT9-B3	-	188	189	-	-	377	0.5	-	0.3	-
REF-CRK-B5	8	88	90	-	-	178	2.2	-	1.1	-
SDLT1-B2	2	83	96	-	-	179	13.5	-	7.3	-

b) Lentic (lake) samples

Station	Whole Organisms	Number of Organisms in Fraction 1	Number of Organisms in Fraction 2	Number of Organisms in Fraction 3	Number of Organisms in Fraction 4	Actual Density*	Precision		Accuracy	
							% range		min	max
REF-03-1	0	77	96	100	104	377	3.8	26.0	1.9	18.3
DL0-02-1	0	97	100	111	112	420	0.9	13.4	4.8	7.6
DL0-02-9	0	166	168	193	195	722	1.0	14.9	6.9	8.0

* whole large organisms excluded in calculations.
min = minimum absolute % error.   max = maximum absolute % error.

Table A.7: Percent recovery of benthic macroinvertebrate samples, Mary River Project CREMP, 2016.

(a) Lotic (creek and river) samples

Station	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
CLT1-US-B4	314	320	98.1%
CLT2-US-B2	136	140	97.1%
REF-CRK-B2	195	200	97.5%
SDLT1-R1-B3	230	232	99.1%
SDLT9-DS-B3	383	392	97.7%
CO-05-B4	407	415	98.1%
EO-01-B5	92	93	98.9%
GO-09-B3	199	201	99.0%
		Average % Recovery	**98.2%**

b) Lentic (lake) samples

Station	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
REF-03-3	99	104	95.2%
JLO-30	124	126	98.4%
BLO-21	155	155	100.0%
		Average % Recovery	**97.9%**

Table A.8: Sample fractions sorted for benthic macroinvertebrates samples, Mary River Project CREMP, 2016. Any samples not listed were sorted in their entirety (total of 68 lotic and 31 lentic samples).

(a) Lotic (creek and river) samples / **b) Lentic (lake) samples**

Station	Fraction Sorted (500 um)	Station	Fraction Sorted (500 um)	Station	Fraction Sorted (500 um)	Station	Fraction Sorted (500 um)	Station	Fraction Sorted (500 um)
CLT1-US-B1	1/2	CLT1-L2-B2	1/4	SDLT1-R1-B2	1/2	REF-03-2	1/ 4	DLO-02-3	1/ 4
CLT1-US-B3	1/2	CLT1-L2-B3	1/4	SDLT1-R1-B3	1/4	JLO-02	1/ 4	DLO-02-11	1/ 4
CLT1-US-B4	1/2	CLT1-L2-B4	1/8	SDLT1-R1-B4	1/2	JLO-21	1/ 4	BLO-20	1/ 2
CLT1-US-B5	1/2	CLT1-L2-B5	1/8	SDLT1-R1-B5	1/2	JLO-30	1/ 2		
CLT1-DS-B1	1/4	REF-CRK-B1	1/4	SDLT9-DS-B1	1/2	JLO-31	1/ 2		
CLT1-DS-B2	1/2	REF-CRK-B2	1/2	SDLT9-DS-B2	1/4	JLO-32	1/ 4		
CLT1-DS-B3	1/4	REF-CRK-B3	1/2	SDLT9-DS-B3	1/2	DD-Hab 9	1/ 4		
CLT1-DS-B4	1/4	REF-CRK-B4	1/2	SDLT9-DS-B4	1/2	DLO-01-3	1/ 4		
CLT1-L2-B1	1/4	SDLT1-R1-B1	1/4	SDLT9-DS-B5	1/4	DLO-01-9	1/ 8		

QA/QC Notes: Pupae were not counted toward total number of taxa unless they were the sole representative of their taxa group. Immatures were not counted toward total number of taxa unless they were the sole representative of their taxa group.

A3.0 DATA QUALITY STATEMENT

The DQR results generally indicated that water, sediment and benthic invertebrate community data were of acceptable quality. Few water quality and sediment quality parameters did not meet acceptable DQO. In general, most parameters that did not meet respective DQO typically showed very low margins of error relative to respective criteria and/or were observed at low concentrations often near MDL which led to relatively small incremental differences in concentrations between replicates resulting in failure to meet DQO. However, key exceptions to this occurred for barium and phenols concentrations, which routinely did not meet DQO in trip, field and equipment blank analyses suggesting that the results for these parameters should be interpreted with caution. Although it was unclear as to the source of barium and phenols in the blank samples, the deionized water used to create blanks has been cited as the most likely source of blank contamination in previous CREMP (KP 2015). The benthic invertebrate community data quality was also acceptable, meeting all required precision, accuracy and percent recovery benchmarks. Overall, the data associated with the 2016 CREMP were considered defensible and acceptable for interpretation and derivation of conclusions with a reasonable level of confidence.

APPENDIX B

REFERENCE AREA DESCRIPTIVE OVERVIEW

APPENDIX B: REFERENCE AREA OVERVIEW

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B.0 OVERVIEW OF REFERENCE CONDITIONS

The initial review of background (reference) data collected from lotic (i.e., creeks and rivers) and lentic (i.e., lakes) study areas as part of the 2015 Mary River Project CREMP revealed naturally elevated metal concentrations above guidelines and significant differences in benthic community endpoints between reference lake littoral and profundal stations (Minnow 2016a). Therefore, this overview of reference conditions is included to provide context and perspective regarding water quality, sediment quality, phytoplankton (chlorophyll a), benthic invertebrate community and fish population characteristics at the CREMP reference study areas. Key implications of reference area features towards the evaluation of potential mine-related effects at mine-exposed water bodies as part of the CREMP are also identified as part of this reference area descriptive.

B.1 Reference Areas

B.1.1 Creek/Tributary Environments

Four reference creek/tributary (reference creek) stations were established among two unnamed tributaries to Angajurjualuk Lake (Stations CLT-REF4, MRY-REF2 and MRY-REF3) and one unnamed tributary to the Mary River (Station CLT-REF3) during the Mary River Project CREMP in 2014[1] (see Figure 2.2). These stations were intended to provide reference information for the creek water quality and phytoplankton monitoring components of the CREMP, and have been used as such in the previous 2015 study and the current 2016 study (see Table 2.1). In 2016, habitat conditions at the western tributary to Angajurjualuk Lake that is used for Baffinland CREMP water quality monitoring (Stations CLT-REF4 and MRY-REF) were deemed comparable to habitat conditions at the Camp Lake and Sheardown Lake tributaries. Therefore, the mid-portion area of this tributary served as a benthic reference creek (REF-CRK) in comparisons to the various mine-exposed tributaries as part of the 2016 CREMP (see Figure 2.4), and herein has been referred to as Unnamed Reference Creek.

The reference creeks/tributaries are moderate gradient lotic systems characterized predominantly by riffle-run and riffle-rapid stream morphology, with pools occurring rarely

[1] No baseline (2005 – 2013) water chemistry, phytoplankton (chlorophyll a), benthic invertebrate community, or fish population data are available for the CLT-REF and MRY-REF reference creek stations, nor for Reference Lake 3, precluding evaluation of mine-related effects at various mine-exposed lotic and lentic systems based on a before-after control-impact (BACI) approach. In addition, because no intensive physico-chemical or biological sampling was conducted at Reference Lake 3 in 2014, no statistical comparisons were able to be conducted between the mine-construction period data (2014) and the 2015 – 2016 data.

as dictated by localized topography and associated gradient. The wetted width and depth of the benthic reference tributary averaged 9.0 m and 0.13 m, respectively, during the August survey in 2016 (Appendix Table F.1). The corresponding water velocities across a representative riffle area of the benthic reference tributary ranged from 0.05 – 0.49 m/s in August 2016 (average of 0.30 m/s; Appendix Table F.1). As for most small lotic systems in the region, surface flow at all of the CREMP reference tributaries is limited to months in which average ambient air temperatures are near or above freezing (i.e., June – September). The substrate at the reference tributaries is composed mainly of cobble and large pebble (i.e., 50 – 256 mm diameter), with surficial areas of sand generally limited to less than 10% of stream area (Appendix Table F.1). In-stream vegetation at the reference tributaries is sparse, and generally includes a relatively thin layer of algae/periphyton attached to surficial substrate in areas providing suitable growing conditions.

B.1.2 River Environments

The area of Mary River located upstream of the mine lease property is only minimally influenced by Mary River Project mining activity (i.e., low amounts of dust deposition; see Baffinland 2014). Therefore, this area has been considered representative of background (reference) conditions for the mine-exposed stations/study areas situated farther downstream on the Mary River under the CREMP (Baffinland 2014; KP 2014a,b, 2015; NSC 2014). Water quality, phytoplankton productivity and benthic invertebrate community (benthic) data collected at the Mary River reference area, referred to as GO-09 (including water quality stations GO-09A, GO-09 and GO-09B), has been used for comparison to data from areas of the Mary River that are potentially influenced by mine activity.

The Mary River reference area is a moderate gradient erosional environment characterized mainly by roughly equal proportions of riffle, run, and rapid stream morphology (Appendix Table F.1). Depending on flow conditions, average wetted width and average depth of the Mary River reference area has ranged from 33 – 55 m and 0.25 - 0.36 m, respectively, in studies conducted by Minnow during the month of August. On average, the corresponding water velocities across representative riffle areas of the GO-09 benthic study area has ranged from 0.20 – 0.47 m/s during these studies. The substrate at the GO-09 reference area is composed mainly of boulder, with cobble and large pebble comprising the surficial substrate at much of the remaining area (Appendix Table F.1). In-stream vegetation at the Mary River GO-09 reference area is sparse, and generally includes a relatively thin layer of algae/periphyton attached to surficial substrate in areas providing suitable growing conditions.

B.1.3 Lake Environments

A geographically expansive reconnaissance survey of local study area (LSA) lakes was conducted in 2014 to identify a waterbody that could potentially serve as a suitable reference area for the mine-exposed lakes (i.e., Camp, Sheardown NW, Sheardown SE and Mary lakes; NSC 2015b). The key criteria for the selection of the suitable reference lake included a waterbody with similar surface area, maximum water depth, substrate features, and fish community species composition as the mine-exposed lakes, in addition to also being uninfluenced by current or past mining activity. Based on the results of this survey, Reference Lake 3 was selected to represent reference conditions for the mine-exposed lakes as part of the 2015 and 2016 Mary River Project CREMP studies (Table B.1).

Table B.1: Comparison of lake physical characteristics for mine-exposed lakes and Reference Lake 3 (data reproduced from NSC 2015b).

Lake Feature		Mine Exposed Lakes			Reference Lake
		Camp	Sheardown NW	Sheardown SE	Reference Lake 3
Physical Characteristics	Drainage Basin Area (km^2)	26.5	6.6	-	23.2
	Lake Area (km^2)	2.21	0.68	0.25	2.05
	Drainage Basin: Lake Area Ratio	11.98	9.66	-	11.32
	Mean Depth (m)	13.0	12.1	7.4	11.8
	Maximum Depth (m)	35.1	30.1	14.8	38.3
	Volume (1,000,000 m^3)	27.5	8.18	1.8	22.6

Reference Lake 3 is an unnamed lake located approximately 62 km south of the Mary Lake Project (see Figures 2.1 and 2.3), well outside the area of mine influence. Reference Lake 3 is a headwater lake that is characterized by a relatively complex morphology that includes three basins and connection to a separate lake by a short, shallow channel (see Figure 2.3). The three basins reach approximately 15 m, 30 m and 36 m in depth with progression from east to west, and the average depth of Reference Lake 3 is approximately 11.8 m (Appendix Table B.1). The outlet of Reference Lake 3, located off the south-central portion of the lake, drains into a large boulder field through which flow can occur largely as sub-surface drainage. Substrate along the shoreline and shallow littoral areas of Reference Lake 3 is composed mainly of large boulder and cobble which is commonly interrupted by areas of bedrock. Substrate of the deeper littoral and profundal areas of Reference Lake 3 is almost exclusively represented by silt loam containing approximately 15% sand (by dry weight) and a moderate organic carbon content of approximately 5%. No substantial aquatic plant beds have been observed at Reference Lake 3, with fish cover provided predominantly by rocky substrates along the shoreline and shallow littoral zone of the lake.

B.2 Background Water Quality

B.2.1 Creek/Tributary Environments

Water chemistry at the reference creek stations showed occasionally elevated phenol and aluminum concentrations compared to WQG and AEMP benchmarks for lotic environments (Appendix Table B.2). Phenols can be formed naturally through the decomposition of organic matter or through synthesis in plants and fungi in the presence of hydrogen peroxide and inorganic chlorine (Michalowicz and Duda 2007). In natural waters, phenol concentrations commonly range from 0.01 to 2 µg/L, and therefore concentrations at the reference creek stations in 2016 appeared to be naturally high, but were not unlike those observed previously in 2015 (i.e., 2015 and 2016 average of 2.6 and 3.2 µg/L, respectively). Spearman's rank correlations conducted using the 2016 reference creek station data indicated a significant positive relationship between phenol concentrations and nitrate and dissolved organic carbon (DOC) concentrations ($r = 0.59$ and 0.75, respectively). This suggested that the elevated phenol concentrations at the stream reference area likely reflected influences associated with natural vegetative decomposition processes.

Total aluminum concentrations at the stream reference stations showed a significant, positive correlation with turbidity (Spearman's Rank $p = 0.017$; $r = 0.67$), suggesting that a high proportion of aluminum was likely bound to, and/or composed, the suspended particulate materials (e.g., aluminosilicate clay minerals). This was supported by examination of the ratio between dissolved and total aluminum concentrations, which indicated that a higher proportion of aluminum was associated with the total (particulate) fraction in 2016 (i.e., 75%, on average; compare Appendix Tables B.2 and C.4). Therefore, despite occasional elevation of total aluminum at the reference creek stations

Table B.2: Water chemistry at reference creek stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark	Spring Sampling Event				Summer Sampling Event				Fall Sampling Event			
					CLT-REF4 27-Jun-2016	CLT-REF3 27-Jun-2016	MRY-REF3 27-Jun-2016	MRY-REF2 27-Jun-2016	CLT-REF4 24-Jul-2016	CLT-REF3 24-Jul-2016	MRY-REF3 25-Jul-2016	MRY-REF2 25-Jul-2016	CLT-REF4 20-Aug-2016	CLT-REF3 20-Aug-2016	MRY-REF3 20-Aug-2016	MRY-REF2 20-Aug-2016
Conventionals[b]	Conductivity (lab)	umho/cm	-	-	22.2	35.3	16.0	39.6	81.9	71.7	56.6	97.2	137	116	111	136
	pH (lab)	pH	6.5 - 9.0	-	7.22	7.38	6.80	7.41	7.90	7.75	7.33	7.78	8.15	7.95	7.78	8.09
	Hardness (as $CaCO_3$)	mg/L	-	-	10	16	<10	18	39	34	21	46	67	57	41	66
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	2.0	<2.0	<2.0	<2.0	2.4	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	18	16	20	26	52	45	32	<13	68	56	60	75
	Turbidity	NTU	-	-	0.82	0.51	3.80	0.67	2.53	1.09	9.87	1.71	0.86	0.91	0.69	1.92
	Alkalinity (as $CaCO_3$)	mg/L	-	-	<10	17	<10	20	38	35	15	44	72	55	34	67
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	0.028	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.022	0.023	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Nitrate and Nitrite (as N)	mg/L	-	-	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	0.022	0.023	<0.021	<0.021
	Dissolved Organic Carbon	mg/L	-	-	<1.0	1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	1.0	1.3	1.1	1.6
	Total Organic Carbon	mg/L	-	-	<1.0	1.2	1.1	1.3	<1.0	1.3	<1.0	1.1	1.2	1.5	1.3	1.9
	Total Phosphorus	mg/L	0.020^{α}	-	0.0058	0.0044	0.0087	0.0173	0.0042	<0.0030	0.0100	0.0042	0.0031	0.0083	0.0047	0.0075
	Phenols	mg/L	0.004^{α}	-	0.0034	0.0024	0.0026	0.0038	0.0013	<0.0010	<0.0010	0.0012	0.0041	0.0073	0.0038	0.0067
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	<0.50	<0.50	1.07	0.58	<0.50	<0.50	2.48	1.19	0.60	<0.50	7.15	1.74
	Sulphate (SO_4)	mg/L	218^{β}	218	<0.30	0.36	1.25	0.31	0.72	1.06	5.27	1.46	1.69	2.64	11.1	2.14
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0250	0.0202	0.0631	0.0180	0.0847	0.0284	***0.263***	0.0649	0.0364	0.0318	0.0969	0.066
	Antimony (Sb)	mg/L	0.020^{α}	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00121	0.00224	0.00217	0.00201	0.00385	0.00457	0.00684	0.00580	0.00562	0.00647	0.0106	0.00847
	Beryllium (Be)	mg/L	0.011^{α}	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	2.12	3.37	1.24	3.72	8.04	6.91	4.71	9.03	14.3	11.6	9.16	14.1
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009^{α}	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	<0.00050	0.00063	<0.00050	<0.00050	<0.00050	0.00096	0.00116	0.00057	0.00064	0.00115	0.00121	<0.0010
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	0.062	<0.030	0.039	0.039	0.209	0.042	<0.030	0.044	0.073	0.057
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000079	0.000100	<0.000050	0.000055	0.000116	0.000251	<0.000050	<0.000050	0.000087	0.000148	<0.00010
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	1.18	1.93	0.632	2.12	4.51	4.08	2.44	5.37	7.91	6.75	4.49	7.91
	Manganese (Mn)	mg/L	0.935^{β}	-	0.000475	0.000394	0.00239	0.000605	0.000525	0.00107	0.00257	0.000842	0.000194	0.00124	0.000886	0.00110
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	<0.000050	0.000149	0.000066	<0.000050	0.000111	0.000391	0.000205	0.000144	0.000287	0.000576	0.000382	0.000273
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00054	<0.00050	<0.00050	<0.00050	0.00074	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	<0.20	0.29	0.24	0.28	0.49	0.53	0.73	0.64	0.69	0.75	1.03	0.904
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050
	Silicon (Si)	mg/L	-	-	0.27	0.49	0.36	0.34	0.80	0.80	1.30	0.80	0.79	0.99	1.13	0.880
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050
	Sodium (Na)	mg/L	-	-	0.211	0.277	0.568	0.407	0.575	0.576	1.73	1.09	1.27	0.989	3.47	1.59
	Strontium (Sr)	mg/L	-	-	0.00165	0.00234	0.00283	0.00285	0.00616	0.00452	0.0103	0.00754	0.0109	0.00770	0.0195	0.0115
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	0.00196
	Tungsten (W)	mg/L	0.030^{α}	-												<0.00010
	Uranium (U)	mg/L	0.015	-	0.000095	0.000212	0.000232	0.000194	0.00137	0.000646	0.000537	0.000962	0.00736	0.00312	0.00154	0.00261
	Vanadium (V)	mg/L	0.006^{α}	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)	mg/L	-	-												<0.00030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

(grey shading) Indicates parameter concentration above applicable Water Qquality Guideline.

BOLD Indicates parameter concentration above AEMP benchmark applicable to the mine lotic receiving environments.

in 2016, these metals were unlikely to be biologically available. No other parameters were observed at concentrations above WQG or the AEMP benchmarks at the reference creek stations in 2016. Notably, manganese also showed a higher proportion in the total fraction compared to the dissolved fraction (i.e., 56%, on average, in the total fraction) at the reference creek stations in 2016, suggesting that a large proportion of aqueous manganese concentrations were also naturally associated with particulate matter in lotic waters near the Mary River Project.

Water chemistry at the reference creek stations showed distinct seasonal changes in concentrations for some parameters (Appendix Figure B.1; Appendix Table B.2). In general, conventional parameters, ions and total metals were observed at lowest concentrations in spring, with intermediate concentrations in the summer and highest concentrations observed during the fall sampling event in 2016 (Appendix Figure B.1). This pattern almost certainly reflected dilution from snow melt- and precipitation-related sources, with the lowest parameter concentrations typically associated with the spring freshet conditions, and highest parameter concentrations generally associated with low precipitation/streamflow conditions later in the open water season. Previous baseline and 2015 water quality monitoring conducted at reference creek stations showed similar seasonal patterns (KP 2014b; Minnow 2016a). Temporal comparison of mean water chemistry for the reference creek stations showed no substantial changes in water quality from 2014 to 2016, suggesting that water chemistry at the reference creek stations was relatively consistent year-to-year taking seasonal sampling timing into account. Therefore, the reference creek stations were deemed to provide a meaningful benchmark for the evaluation of potential mine-related influences on water chemistry at mine-exposed creek/ tributary receiving environments.

B.2.2 River Environments

Water chemistry at the Mary River reference stations (GO-09 series) showed elevated phenol, aluminum, iron and total phosphorus concentrations compared to WQG and/or applicable AEMP benchmarks in at least one seasonal sampling event in 2016 (Appendix Table B.3). Similar to the reference creek stations, significant positive relationships between phenol and DOC concentrations at the Mary River GO-09 reference stations in 2016 (Spearman Rank Correlation $p = 0.01$ and $r = 0.80$) suggested that elevated phenol concentrations at the Mary River reference area were associated with influences from natural decomposition of vegetation. Mary River GO-09 reference station total aluminum and iron concentrations, as well as total concentrations of other metals including chromium, cobalt, copper, lead, nickel and titanium, showed strong positive correlations

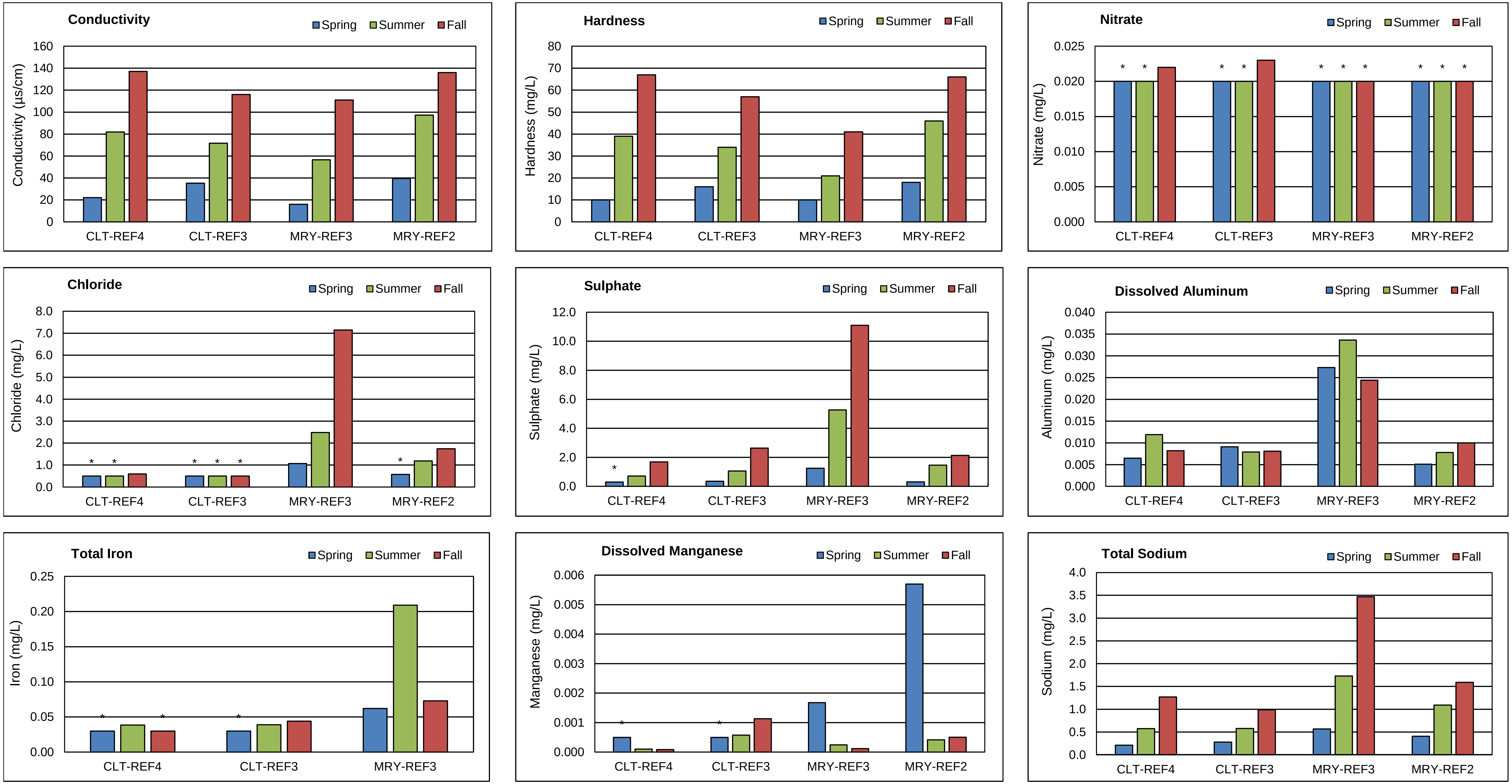


Figure B.1: Seasonal variation in water chemistry at stream/tributary reference stations, Mary River Project CREMP, 2016. Asterisk (*) indicates that the parameter concentration was below the method detection limit.

Table B.3: Water chemistry at Mary River GO-09 series reference stations, Mary River Project CREMP, 2016.

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark	Spring Sampling Event			Summer Sampling Event			Fall Sampling Event		
					G0-09-A 29-Jun-2015	G0-09 29-Jun-2015	G0-09-B 29-Jun-2015	G0-09-A 19-Jul-2015	G0-09 19-Jul-2015	G0-09-B 19-Jul-2015	G0-09-A 13-Aug-2015	G0-09 13-Aug-2015	G0-09-B 13-Aug-2015
Conventionals[b]	Conductivity (lab)	umho/cm	-	-	21.4	25.6	23.9	104	72.3	72.2	138	147	140
	pH (lab)	pH	6.5 - 9.0	-	6.86	6.94	7.06	7.97	7.905	7.94	8.03	8.01	8.01
	Hardness (as $CaCO_3$)	mg/L	-	-	<10	13	11	49	33.5	33	62	65	66
	Total Suspended Solids (TSS)	mg/L	-	-	46.4	13.6	12.8	<2.0	2.2	2.8	5.6	3.2	4.4
	Total Dissolved Solids (TDS)	mg/L	-	-	<20	<20	<20	51	59	43	70	73	73
	Turbidity	NTU	-	-	16.6	8.08	8.75	2.05	10.05	9.67	16.5	13.8	17.7
	Alkalinity (as $CaCO_3$)	mg/L	-	-	<10	11	<10	52	35.5	35	57	59	59
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.021	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.16
	Dissolved Organic Carbon	mg/L	-	-	<1.0	1.3	1.1	<1.0	<1.0	<1.0	1.3	1.4	1.4
	Total Organic Carbon	mg/L	-	-	1.1	1.5	1.1	<1.0	<1.0	<1.0	1.1	1.3	1.3
	Total Phosphorus	mg/L	0.020[α]	-	0.0862	0.0214	0.021	0.0056	0.00895	0.0134	0.0122	0.0079	0.0115
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0048	0.0040	0.0050
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	<0.50	<0.50	<0.50	1.54	1.07	1.09	6.48	5.38	5.21
	Sulphate (SO_4)	mg/L	218[β]	218	0.33	<0.30	0.31	1.0	0.8	0.9	3.77	3.34	3.23
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	**0.374**	0.159	**0.213**	0.0815	0.135	0.119	**0.695**	**0.425**	**1.01**
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012
	Barium (Ba)	mg/L	-	-	0.00553	0.00296	0.00368	0.0067	0.0060	0.0060	0.012	0.0111	0.0136
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	2.63	2.94	2.65	10	7	7	13.1	14.1	13.9
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00083	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00109	0.00077	0.00168
	Cobalt (Co)	mg/L	0.0009[α]	0.004	0.00031	0.00011	0.00016	<0.00010	<0.00010	<0.00010	0.00024	0.00017	0.00032
	Copper (Cu)	mg/L	0.002	0.0022	0.00119	0.00061	0.00078	0.0008	0.0008	0.0009	0.0014	0.0013	0.0019
	Iron (Fe)	mg/L	0.30	0.326	**0.512**	0.155	0.256	0.046	0.114	0.100	**0.559**	**0.367**	**0.75**
	Lead (Pb)	mg/L	0.001	0.001	0.000602	0.000278	0.000303	0.00006	0.00018	0.00016	0.00044	0.00033	0.00052
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	0.0012
	Magnesium (Mg)	mg/L	-	-	1.58	1.56	1.48	5.48	3.77	3.77	7.53	8.21	8.17
	Manganese (Mn)	mg/L	0.935[β]	-	0.0137	0.0055	0.00683	0.00065	0.00147	0.00132	0.0066	0.0046	0.0085
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	<0.000050	<0.000050	<0.000050	0.00016	0.00015	0.00015	0.00041	0.00034	0.00044
	Nickel (Ni)	mg/L	0.025	0.025	0.00068	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00083	0.0006	0.00111
	Potassium (K)	mg/L	-	-	0.44	0.34	0.39	0.86	0.78	0.76	1.4	1.27	1.5
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.79	0.55	0.63	0.90	0.74	0.72	1.72	1.29	2.47
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050
	Sodium (Na)	mg/L	-	-	0.334	0.217	0.328	1.610	1.130	1.120	3.38	3.24	3.24
	Strontium (Sr)	mg/L	-	-	0.00265	0.00208	0.00243	0.009	0.008	0.008	0.0166	0.0158	0.0166
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000014	0.000011	0.000017
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.028	<0.010	0.016	<0.010	<0.010	<0.010	0.0326	0.022	0.0449
	Uranium (U)	mg/L	0.015	-	0.000356	0.000135	0.00021	0.0011	0.0010	0.0009	0.00437	0.00408	0.00388
	Vanadium (V)	mg/L	0.006[α]	0.006	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00126	0.00091	0.00158
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)	mg/L	-	-				<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

(shaded) Indicates parameter concentration above applicable Water Qquality Guideline.

BOLD Indicates parameter concentration above AEMP benchmark applicable to the mine lotic receiving environments.

with turbidity (Spearman Rank Correlation $p \leq 0.01$, $r \geq 0.80$). This, combined with the fact that no significant correlations were indicated between the dissolved concentrations of these metals and turbidity, suggested that total metal concentrations were largely associated with suspended particulate matter and that elevation of total metal concentrations above WQG reflected naturally turbid conditions. Comparison of the ratio between dissolved and total concentrations of aluminum and iron also indicated a high proportion of these metals was in the total (particulate) fraction in 2016 (i.e., 86% and 83%, respectively, on average; compare Appendix Tables B.3 and C.52).

Water chemistry at the Mary River reference stations showed distinct seasonal changes in concentrations of some parameters (Appendix Figure B.2; Appendix Table B.3). These seasonal changes in parameter concentrations were consistent with those observed at the reference creek stations in 2016, and in previous baseline (2005 – 2013) and 2015 water quality monitoring data collected at the Mary River GO-09 series reference stations (KP 2014b; Minnow 2016). The seasonal changes in the Mary River reference station parameter concentrations likely reflected greater dilution during the spring snowmelt period, and lower precipitation during the summer and fall periods. Temporal comparison of the Mary River GO-09 series reference station water chemistry indicated that on average, parameter concentrations in 2016 were comparable to, or in the upper range of, those observed during the baseline period and previous operating mine conditions based on fall monitoring data (Figure 5.2; Appendix Figure C.20). The occurrence of relatively high parameter concentrations in 2016 at the Mary River GO-09 reference station potentially reflected greater turbidity compared to previous studies, and suggested that water chemistry of Mary River is naturally variable as a result of the factors that affect turbidity. Nevertheless, on the whole, the Mary River reference stations were deemed to provide a meaningful benchmark for the evaluation of potential mine-related influences on water chemistry at the Mary River mine-exposed stations and/or study areas.

B.2.3 Lake Environments (Reference Lake 3)

In-situ water temperature profiles conducted at Reference Lake 3 indicated a thermally stratified water column at the main lake basin in the summer, and throughout the lake in the fall of 2016 (Appendix Figure B.3). The thermocline was present between depths of approximately 5 and 8 m in the summer, and approximately 11 and 14 m in the fall (Appendix Figure B.3). Despite the occurrence of thermal stratification in 2016, no marked changes in dissolved oxygen concentration occurred with increased depth at any of the Reference Lake 3 basins, and dissolved oxygen saturation remained high (i.e., ≥ 95%) throughout the entire water column in both the summer and fall profiles (Appendix Figure

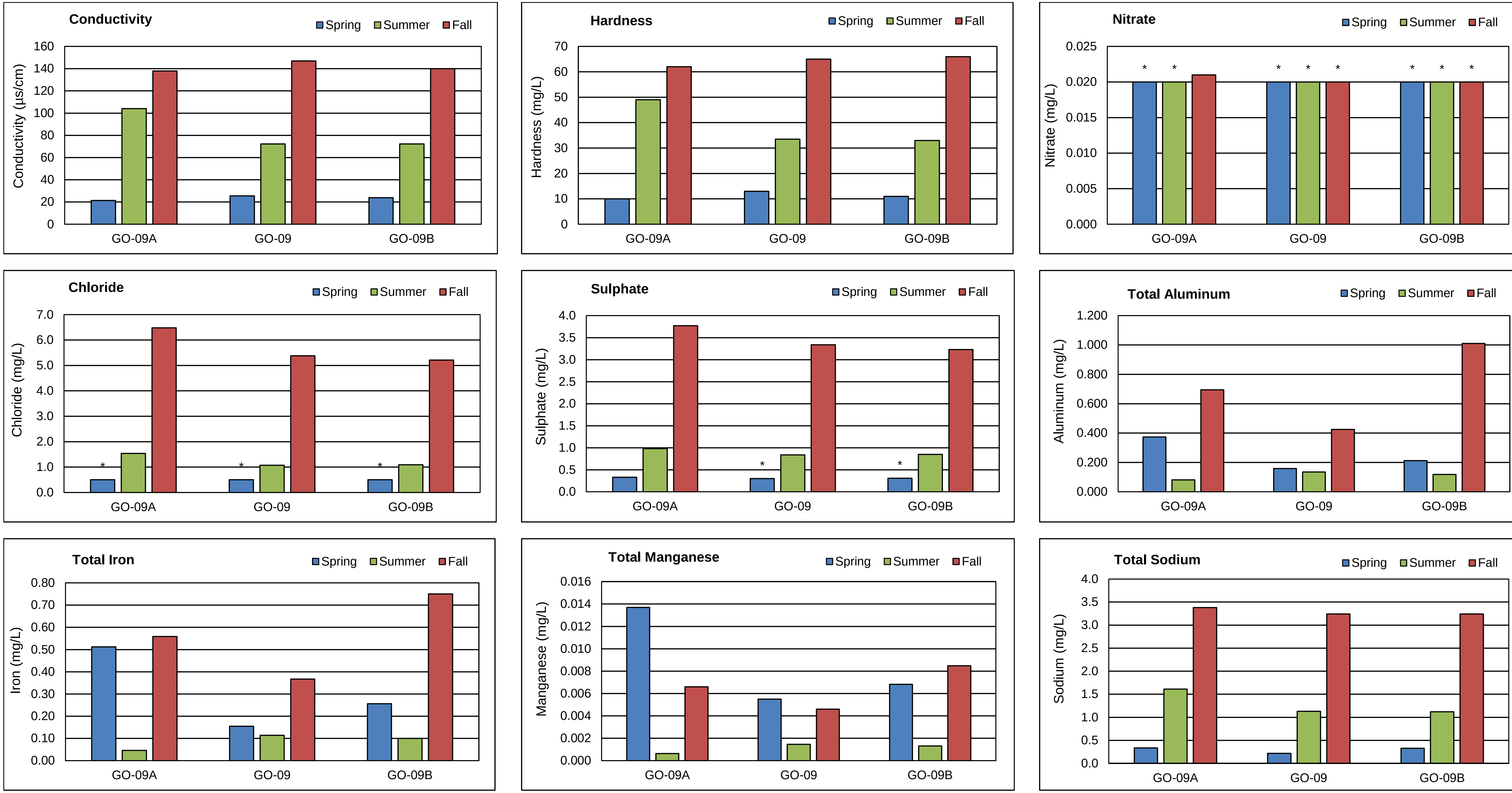


Figure B.2: Seasonal variation in water chemistry at Mary River (GO-09) reference stations, Mary River Project CREMP, 2016. Asterisk (*) indicates that the parameter concentration was below the method detection limit.

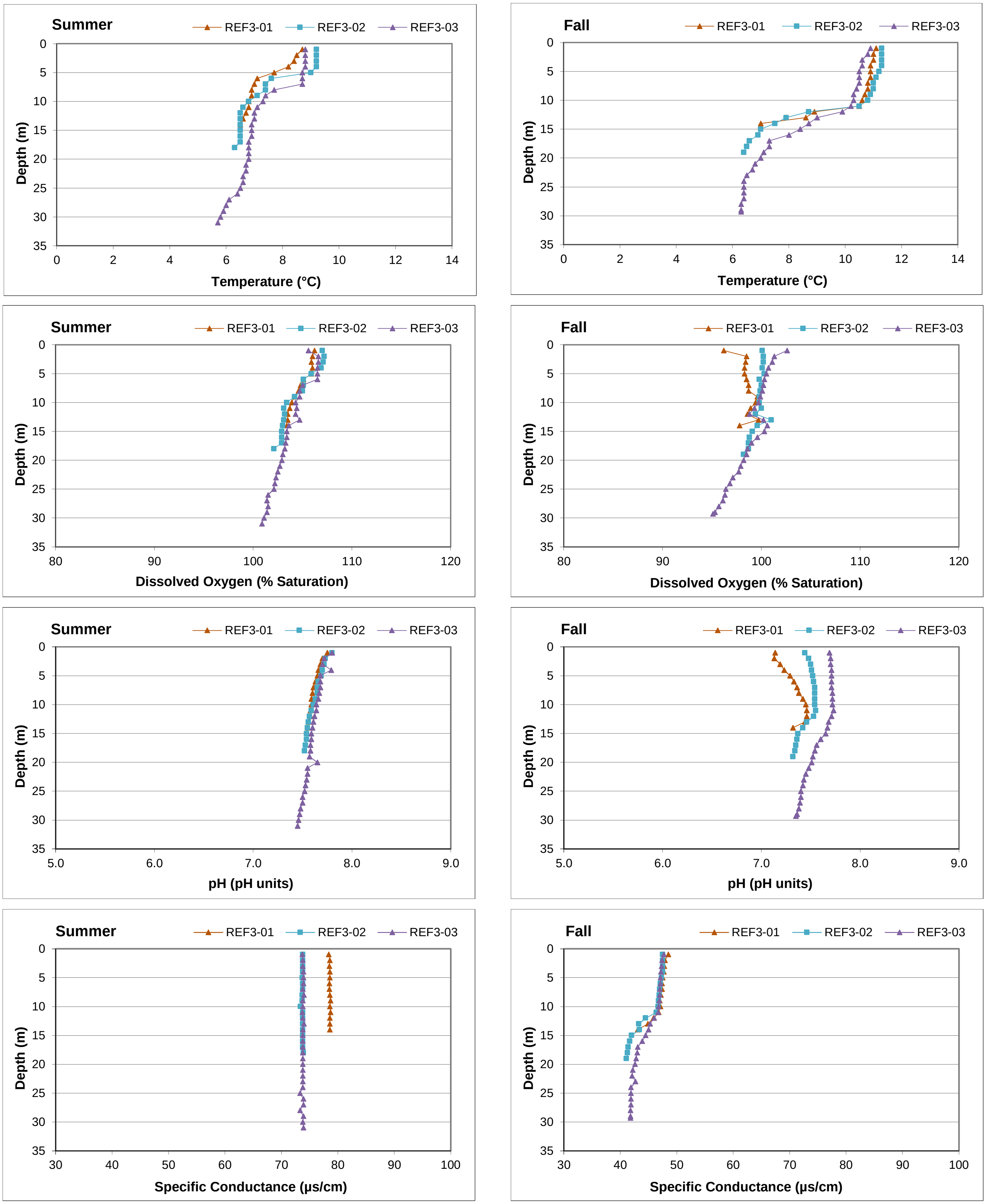


Figure B.3: ***In-situ*** **water quality with depth from surface at Reference Lake 3 during summer and fall sampling events, Mary River Project CREMP, 2016.**

B.3). The 2016 water quality profiles also showed only minor changes in pH and specific conductance among stations and with depth in each of the summer and fall sampling events (Appendix Figure B.3). Overall, the *in-situ* water quality profiles suggested relatively thorough lateral mixing within Reference Lake 3 and that, despite development of thermal stratification in 2016, no substantial influences on dissolved oxygen, pH or conductivity were associated with the changes in temperature with depth.

The evaluation of water chemistry at Reference Lake 3 showed that, consistent with observations at the lotic reference stations, aqueous phenol concentrations were occasionally elevated above WQG (Appendix Table B.4). In addition, similar to the Mary River GO-09 series reference stations, total phosphorus concentrations were elevated above WQG at Reference Lake 3, albeit in only one of six samples taken in 2016 (Appendix Table B.4). No other parameters were observed at concentrations above WQG at Reference Lake 3 in 2016. In addition, no parameters were observed at concentrations above lentic AEMP benchmarks at Reference Lake 3 (Appendix Table B.4), suggesting that these water quality benchmarks were relevant to the mine LSA lakes. No substantial differences in water chemistry were observed between the summer and fall at Reference Lake 3 in 2016, which was similar to observations among winter, summer and fall at LSA lakes during the mine baseline period and in summer and fall at Reference Lake 3 in 2015 (KP 2014a,c; Minnow 2016a).

Water chemistry data collected at Reference Lake 3 showed no consistent differences in parameter concentrations between the surface and the bottom of the water column at each individual station (Appendix Figure B.4; Appendix Table B.4). The lack of any appreciable depth-related differences in parameter concentrations at each station likely reflected only minor differences in dissolved oxygen saturation, pH and/or specific conductance with increased depth from the surface. Because anoxic conditions do not appear to develop at Reference Lake 3, reducing conditions conducive to metal mobilization from sediment to the overlying water are less likely to occur near the lake bottom, resulting in relative uniform water chemistry between surface and bottom waters of Reference Lake 3. Accordingly, metal concentrations can naturally be expected to be similar between surface and bottom of LSA lakes provided no substantial gradients in dissolved oxygen saturation, pH and/or specific conductance occur within the water column.

Table B.4: Water chemistry at Reference Lake 3, Mary River Project CREMP, 20116.

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event						Fall Sampling Event					
					REF3-01 surface 16-Jul-2016	REF3-01 bottom 16-Jul-2016	REF3-02 surface 28-Jul-2016	REF3-02 bottom 28-Jul-2016	REF3-03 surface 28-Jul-2016	REF3-03 bottom 28-Jul-2016	REF3-01 surface 20-Aug-2016	REF3-01 bottom 20-Aug-2016	REF3-02 surface 19-Aug-2016	REF3-02 bottom 19-Aug-2016	REF3-03 surface 20-Aug-2016	REF3-03 bottom 20-Aug-2016
Conventionals[b]	Conductivity (lab)	umho/cm	-	-	76.5	76.4	76.4	76.3	76.6	76.0	123.5	76.2	76.7	76.4	76.5	76.6
	pH (lab)	pH	6.5 - 9.0	-	7.67	7.63	7.70	7.67	7.71	7.55	7.77	7.72	7.74	7.53	7.77	7.53
	Hardness (as $CaCO_3$)	mg/L	-	-	36	35	35	35	35	36	35	34	35	35	34	35
	Total Suspended Solids (TSS)	mg/L	-	-	3.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	43	49	44	47	46	49	37	33	39	40	41	41
	Turbidity	NTU	-	-	0.21	0.23	0.25	0.22	0.22	0.22	0.44	0.43	0.28	0.31	0.29	0.25
	Alkalinity (as $CaCO_3$)	mg/L	-	-	37	34	37	33	31	29	32	32	31	32	35	36
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.046	0.043	0.060	0.050
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.20	<0.15	0.18	<0.15	0.21	0.23	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Nitrate and Nitrite (as N)	mg/L	-	-	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
	Dissolved Organic Carbon	mg/L	-	-	2.5	2.4	2.7	2.8	2.6	2.5	2.8	2.7	2.6	2.7	2.6	2.7
	Total Organic Carbon	mg/L	-	-	2.7	2.7	2.6	2.7	2.7	2.7	2.8	2.8	2.7	2.8	2.8	2.8
	Total Phosphorus	mg/L	0.020[α]	-	0.0055	0.0044	0.0038	0.0052	0.0099	0.0037	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	0.0440
	Phenols	mg/L	0.004[α]	-	0.0018	0.0028	0.0021	0.0023	0.0029	0.0037	0.0027	0.0017	0.0038	0.0050	0.0016	0.0038
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.28	1.37	1.59	1.30	1.33	1.31	1.27	1.28	1.26	1.28	1.26	1.29
	Sulphate (SO_4)	mg/L	218[β]	218	4.21	4.29	4.66	4.20	4.24	4.23	4.08	4.08	4.05	4.10	4.03	4.10
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0058	0.0031	<0.0030	0.0069	0.0034	0.0034	0.0035	<0.0030	0.0045	0.0084	<0.0030	<0.0030
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00638	0.00676	0.00658	0.00661	0.00690	0.00666	0.00665	0.00647	0.00647	0.00661	0.00649	0.00647
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	7.10	7.15	7.05	6.91	7.15	7.14	7.00	6.91	7.29	7.01	6.90	6.83
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	0.000535	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00070	0.00072	0.00078	0.00081	0.00081	0.00081	0.00083	0.00097	0.00078	0.00077	0.00073	0.00084
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	4.16	4.36	4.46	4.28	4.51	4.62	4.37	4.34	4.11	4.32	4.29	4.14
	Manganese (Mn)	mg/L	0.935[β]	-	0.000646	0.000756	0.000657	0.000777	0.000823	0.000788	0.000570	0.000559	0.000582	0.000897	0.000535	0.000571
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000118	0.000115	0.000125	0.000123	0.000157	0.000120	0.000130	0.000132	0.000133	0.000182	0.000125	0.000116
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.82	0.88	0.89	0.88	0.89	0.89	0.90	0.88	0.89	0.89	0.88	0.87
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.43	0.45	0.44	0.45	0.44	0.47	0.40	0.40	0.39	0.46	0.39	0.48
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.790	0.846	0.847	0.839	0.855	0.847	0.832	0.840	0.841	0.836	0.831	0.835
	Strontium (Sr)	mg/L	-	-	0.00805	0.00800	0.00791	0.00780	0.00802	0.00801	0.00816	0.00802	0.00841	0.00815	0.00799	0.00798
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000249	0.000249	0.000252	0.000249	0.000258	0.000253	0.000282	0.000266	0.000280	0.000269	0.000275	0.000247
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)	mg/L	-	-												

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using background water quality data. The values are specific to the Camp Lake system.

(grey shading) Indicates parameter concentration above applicable Water Quality Guideline.

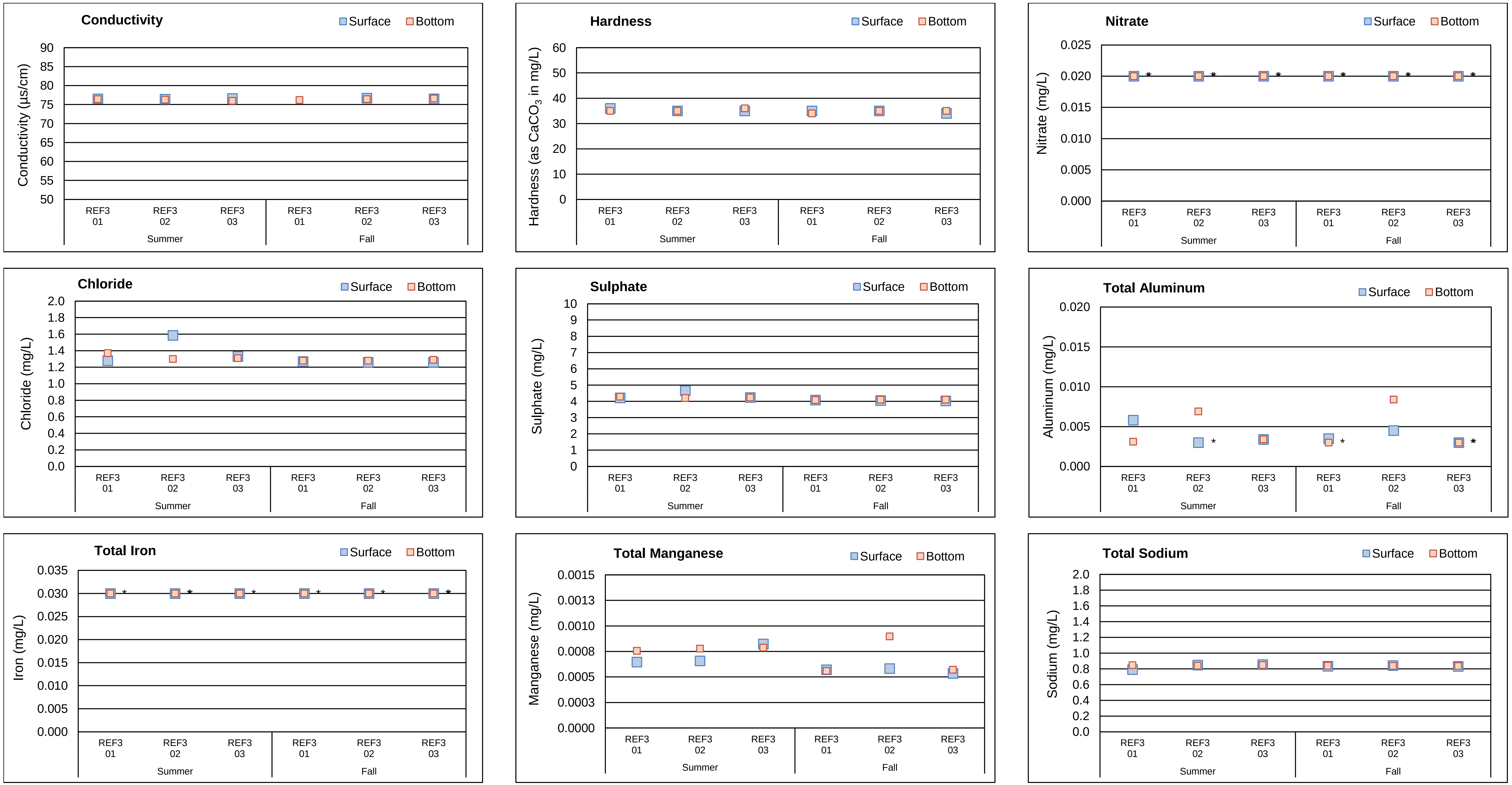


Figure B.4: Water chemistry comparison between the surface and the bottom of the water column at Reference Lake 3 routine monitoring stations during summer and fall, Mary River Project CREMP, 2016. Asterisk (*) indicates that the parameter concentration was below the laboratory method detection limit.

B.3 Background Sediment Quality Observations

B.3.1 Lotic Environments

The Mary River Project CREMP had proposed sediment chemistry sampling at lotic areas of the Camp Lake tributaries, Sheardown Lake tributaries, and the Mary River to provide qualitative information to support the lake sediment chemistry data analysis (KP 2014a, 2015). However, these watercourses were found to contain very limited depositional habitat during field studies conducted in 2014 and 2015 (KP 2015; Minnow 2016a), as well as in the current 2016 study. The general absence of any substantial accumulation of fine sediments within these watercourses precluded any meaningful assessment of potential mine-related influences on sediment chemistry within, along and/or between watercourses, and therefore no sediment chemistry sampling was conducted at lotic environments as part of the 2016 CREMP.

B.3.2 Lake Environments (Reference Lake 3)

Sediment sampling was conducted at littoral and profundal (i.e., <12 m and >12 m depths, respectively) areas of Reference Lake 3 in 2015 and 2016 for the analysis of particle size, total organic carbon (TOC) content and total metal concentrations (see Figure 2.3). Surficial sediment at Reference Lake 3 littoral and profundal areas was composed of silty to sandy loam material with moderate TOC content. Substrate particle size differed significantly between the Reference Lake 3 littoral and profundal habitats, with a significantly higher and lower proportion of sand- and clay-sized material, respectively, present at littoral stations compared to profundal stations (Appendix Table B.5). No significant differences in sediment TOC content occurred between the littoral and profundal habitats. A surficial and/or sub-surface layer of oxidized material (likely iron hydroxide or oxy-hydroxides), visible as an orange-brown floc or distinct layer, was commonly observed in sediments of Reference Lake 3 (Appendix Tables D.1 - D.3). In addition, sub-surface sediment of Reference Lake 3 occasionally contained blackened/ dark colouration, which suggested the occurrence of reducing (i.e., anoxic) sediment conditions (Appendix Tables D.2 and D.3). The physical properties of sediment observed at Reference Lake 3 in 2016 were consistent with those of the 2015 study (Minnow 2016a).

Sediment metal concentrations at Reference Lake 3 were generally lower at the littoral stations than at the profundal stations, although less than a two-fold difference in concentrations was typically shown for most parameters between the littoral and profundal station depths (Appendix Table B.6; Appendix Figure B.5). The differences in sediment metal concentrations between the littoral and profundal station depths likely reflected a

Table B.5: Statistical comparison of substrate physical properties between littoral and profundal sediment stations of Reference Lake 3, Mary River Project CREMP, August 2016.

Lake	Habitat Variable	Statistical Test Results			Summary Statistics						
		Significant Difference Between Areas?	*p*-value	Statistical Analysis[a]	Station Type	N	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Reference Lake 3	Sand (% by weight)	YES	0.009	β	Littoral	5	42.5	18.1	8.1	19.9	66.6
					Profundal	5	16.7	3.5	1.5	13.0	20.5
	Silt (% by weight)	YES	0.012	β , γ	Littoral	5	53.1	16.3	7.3	31.1	74.0
					Profundal	5	76.1	3.1	1.4	72.3	78.4
	Clay (% by weight)	YES	0.036	β , δ	Littoral	5	4.4	2.2	1.0	2.3	7.4
					Profundal	5	7.2	0.9	0.4	6.3	8.7
	TOC (%)	NO	0.824	α , δ	Littoral	5	4.8	2.0	0.9	3.3	8.0
					Profundal	5	4.6	0.3	0.1	4.3	5.0

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data logit transformed, single factor ANOVA test conducted; γ - single factor ANOVA test results validated using Mann-Whitney U-test; and, δ - single-factor ANOVA test results validated using t-test assuming unequal variance.

Highlighted values indicate significant difference between lake depths based on ANOVA p-value less than 0.10.

Table B.6: Sediment particle size, total organic carbon, and metal concentrations at Reference Lake 3 (REF-03) sediment stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Littoral Stations							Profundal Stations						
					REF-03-1	REF-03-2	REF-03-3	REF-03-4	REF-03-5	Mean	Standard Error	REF-03-6	REF-03-7	REF-03-8	REF-03-9	REF-03-10	Mean	Standard Error
Non-metals	Sand	%	-	-	66.6	32.9	39.8	53.5	19.9	42.5	8.1	20.5	13.0	15.2	13.4	20.2	16.5	1.15
	Silt	%	-	-	31.1	59.8	56.5	43.9	74.0	53.1	7.29	72.3	78.3	78.4	78.2	73.1	76.1	0.97
	Clay	%	-	-	2.30	7.4	3.70	2.70	6.10	4.4	0.99	7.2	8.7	6.3	8.4	6.7	7.5	0.33
	Moisture	%	-	-	95.4	99.0	89.8	97.7	66.6	89.7	5.99	72.9	70.5	93.2	72.5	97.6	81.3	4.10
	Total Organic Carbon	%	10[α]	-	5.39	8.04	3.30	4.09	3.42	4.85	0.88	4.31	4.82	5.03	4.36	4.65	4.63	0.096
Metals	Aluminum (Al)	mg/kg	-	-	15,200	17,700	16,600	16,400	16,500	16,480	397	23,700	30,300	25,500	21,100	24,400	25,000	1,068
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0.19	<0.10	<0.10	<0.10	<0.10	<0.10	0
	Arsenic (As)	mg/kg	17	5.9 - 6.2[c]	2.74	3.87	4.23	3.67	4.04	3.71	0.26	**5.96**	**7.24**	**6.98**	**6.24**	**6.25**	**6.53**	0.173
	Barium (Ba)	mg/kg	-	-	115	153	96.4	96.6	98.4	112	11	144	187	167	179	147	165	6.02
	Beryllium (Be)	mg/kg	-	-	0.61	0.70	0.70	0.69	0.67	0.67	0.02	0.96	1.20	1.04	0.87	0.99	1.01	0.039
	Bismuth (Bi)	mg/kg	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	0.00	<0.20	0.22	0.21	<0.20	<0.20	0.21	0.0028
	Boron (B)	mg/kg	-	-	11.4	16.4	12.1	12.4	12.9	13.0	0.9	17.8	22.4	20.3	17.3	18.1	19.2	0.68
	Cadmium (Cd)	mg/kg	3.5	1.5	0.135	0.284	0.095	0.096	0.121	0.146	0.035	0.165	0.200	0.205	0.194	0.153	0.183	0.007
	Calcium (Ca)	mg/kg	-	-	6,190	6,310	4,230	4,150	4,760	5,128	470	6,000	6,630	6,040	5,710	6,210	6,118	106.9
	Chromium (Cr)	mg/kg	90	79 - 98[c]	57.2	57.7	52.6	51.8	55.5	55.0	1.2	74.3	**93.8**	**84.2**	68.1	76.1	**79.3**	3.14
	Cobalt (Co)	mg/kg	-	-	8.87	8.86	11.6	11.2	10.2	10.1	0.6	16.9	20.9	18.6	18.4	17.0	18.4	0.51
	Copper (Cu)	mg/kg	197	50 - 58[c]	**55**	**96**	**60**	**64**	**58**	**66**	7	**94.6**	**121**	**105**	**83.6**	**98.1**	**100**	4.38
	Iron (Fe)	mg/kg	40,000[α]	34,400 - 52,400[c]	21,400	21,400	**34,900**	**37,400**	34,100	29,840	3,488	**49,200**	**60,700**	**55,200**	**61,000**	**48,900**	**55,000**	1,867
	Lead (Pb)	mg/kg	91.3	35	15.2	**95.9**	**79.9**	24.2	15.0	**46.0**	17.4	25.5	26.7	**48.8**	33.3	19.2	30.7	3.57
	Lithium (Li)	mg/kg	-	-	27.4	28.3	27.9	26.9	26.1	27.3	0.4	37.4	49.4	42.8	37.4	40.8	41.6	1.57
	Magnesium (Mg)	mg/kg	-	-	11,600	11,200	10,700	9,960	10,800	10,852	274	15,300	19,000	16,700	13,400	15,600	16,000	650
	Manganese (Mn)	mg/kg	1,100[α,β]	657 - 4,370	286	297	**686**	**767**	442	496	99	**1,170**	**1,420**	**2,020**	**6,010**	**1,170**	**2,358**	654.9
	Mercury (Hg)	mg/kg	0.486	0.17	0.0475	0.0515	0.0199	0.0234	0.0353	0.0355	0.0063	0.0633	0.0699	0.0738	0.0770	0.0687	0.0705	0.00165
	Molybdenum (Mo)	mg/kg	-	-	0.72	1.36	3.18	2.72	2.97	2.19	0.49	2.75	3.20	3.35	6.57	2.56	3.69	0.520
	Nickel (Ni)	mg/kg	75[α,β]	66 - 77[c]	40.1	44.4	35.8	35.7	37.1	38.6	1.6	53.3	65.1	59.1	50.0	53.0	56.1	1.90
	Phosphorus (P)	mg/kg	2,000[α]	1,278 - 1,958[c]	781	760	827	810	1,020	840	47	1,050	**1,320**	1,180	1,060	1,040	1,130	38.1
	Potassium (K)	mg/kg	-	-	3,280	4,260	4,170	3,820	3,940	3,894	172	5,460	6,870	6,040	4,990	5,830	5,838	221.8
	Selenium (Se)	mg/kg	-	-	0.45	0.69	0.36	0.39	0.55	0.49	0.06	0.67	0.93	1.00	0.92	0.78	0.86	0.042
	Silver (Ag)	mg/kg	-	-	0.11	0.16	<0.10	<0.10	0.11	0.12	0.01	0.24	0.32	0.28	0.22	0.26	0.26	0.012
	Sodium (Na)	mg/kg	-	-	254	403	260	250	313	296	29	412	527	491	382	437	450	18.6
	Strontium (Sr)	mg/kg	-	-	12.1	12.9	10.3	10.0	11.5	11.4	0.5	14.7	17.8	16.3	14.8	15.5	15.8	0.40
	Sulphur (S)	mg/kg	-	-	<5,000	<5,000	<5,000	<5,000	<5,000	5,000	0	<5,000	<5,000	<5,000	<5,000	<5,000	5,000	0
	Thallium (Tl)	mg/kg	-	-	0.325	0.389	0.418	0.362	0.445	0.388	0.021	0.723	0.916	0.845	0.789	0.748	0.804	0.0246
	Tin (Sn)	mg/kg	-	-	5.9	137	116	17.9	4.8	56.3	28.9	9.9	7.9	46.4	23.7	2.3	18.0	5.597
	Titanium (Ti)	mg/kg	-	-	1,050	1,060	1,010	1,030	1,210	1,072	36	1,280	1,580	1,370	1,200	1,220	1,330	48.9
	Uranium (U)	mg/kg	-	-	8.73	10.9	17.5	9.95	12.4	11.9	1.5	26.4	31.6	29.5	22.6	26.0	27.2	1.09
	Vanadium (V)	mg/kg	-	-	45.0	50.7	51.6	52.5	50.1	50.0	1.3	68.6	84.0	75.4	60.9	68.8	71.5	2.74
	Zinc (Zn)	mg/kg	315	123 - 135[c]	67.3	82.2	70.0	77.0	72.0	73.7	0.5	101	122	109	87.7	101	104.1	3.98
	Zirconium (Zr)	mg/kg	-	-	5.0	6.5	3.3	3.2	3.7	4.1	0.1	3.6	4.6	4.2	3.1	3.9	3.9	0.2

[a] Canadian Sediment Quality Guideline, probable effects level (PEL; CCME 2016) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2015)).

[b] Baffinland Mary River Project Aquatic Effects Monitoring Program (AEMP) sediment quality benckmarks (Baffinland 2014, 2016; Intrinsik 2014, 2015).

[c] The AEMP benchmarks were derived for individual mine-exposed lakes, and therefore a range of values is presented to reflect the AEMP benchmark variation among the mine-exposed lakes. Reference Lake 3 sediment chemistry was screened against the lowest AEMP benchmark for applicable, respective, parameters.

[shaded box] Indicates paramter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

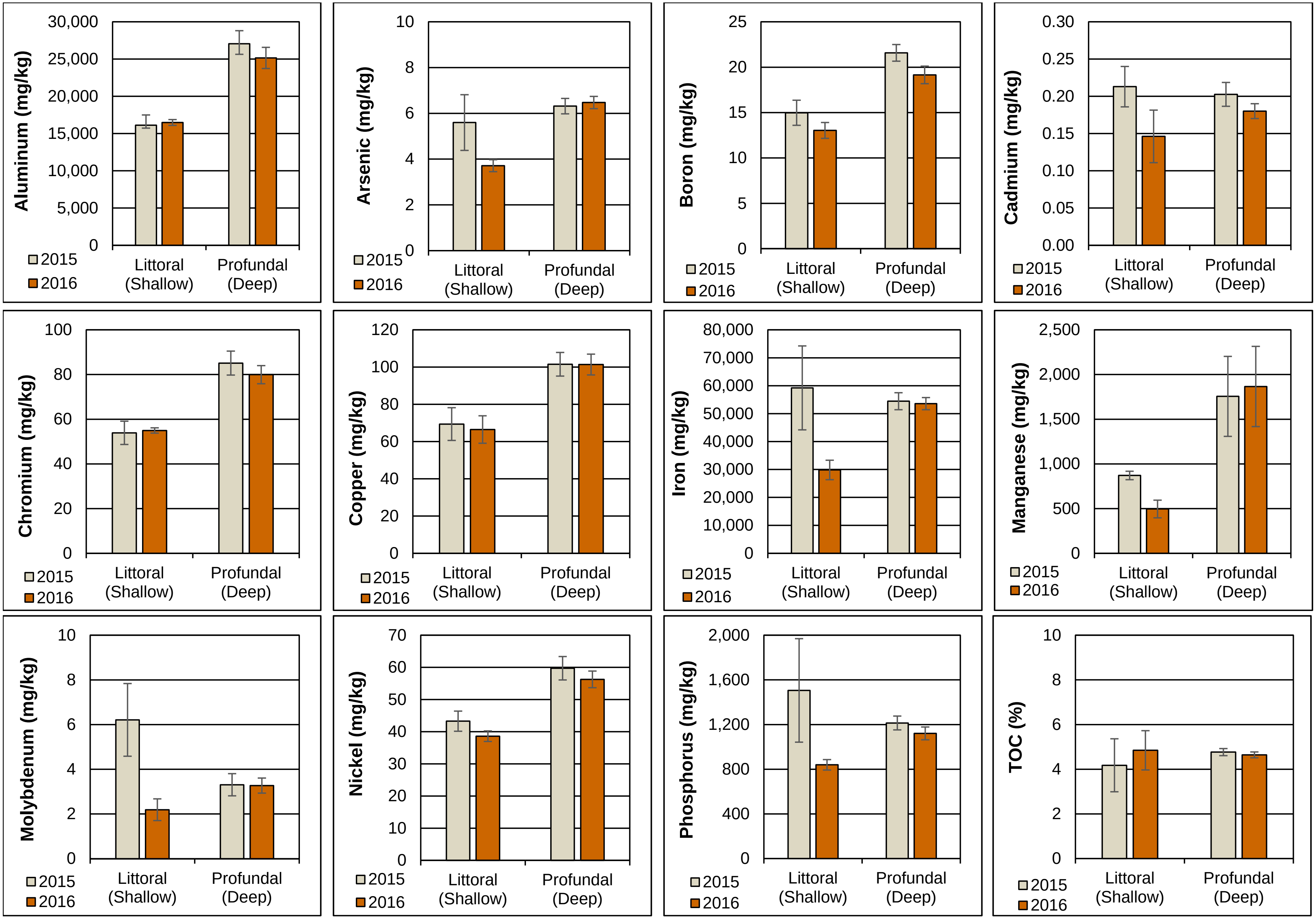


Figure B.5: Sediment metal concentrations (mean ± SE) at littoral (<12m depth) and profundal (>12m depth) monitoring stations of Reference Lake 3 (REF03), Mary River Project CREMP, August 2016.

naturally higher proportion of fine silt- and clay-sized particles at the latter, which is consistent with expected depositional patterns in lakes. Among metals with established SQG, mean concentrations of iron and manganese were elevated above respective SQG only at profundal stations of Reference Lake 3 in 2016 (Appendix Table B.6). Sediment chromium and lead concentrations were also elevated above SQG at a single profundal and littoral station of Reference Lake 3, respectively (Appendix Table B.6). Therefore, compared to SQG, high concentrations of iron and manganese, and chromium and lead to a lesser extent, appear to occur naturally in sediments of Mary River Project LSA lakes. Mean copper and lead concentrations at littoral stations, and mean arsenic, chromium, copper, iron and manganese concentrations at profundal stations, were above the most stringent (i.e., lowest) AEMP sediment quality benchmarks at Reference Lake 3 (Appendix Table B.6). This suggested that the AEMP sediment benchmarks for these metals were conservative.

B.4 Phytoplankton Productivity (Chlorophyll a) Observations

B.4.1 Lotic Environments

Chlorophyll a concentrations, which were used as a surrogate for phytoplankton abundance, ranged from approximately 0.14 – 0.59 µg/L at the reference creek and river stations among spring, summer and fall sampling events in 2016 (Appendix Table B.7). Therefore, lotic reference station chlorophyll a concentrations were consistently well below the AEMP benchmark of 3.7 µg/L, and reflected low (i.e., oligotrophic) phytoplankton productivity according to Dodds et al (1998) trophic status classification for stream environments. This trophic status classification was consistent with an 'oligotrophic' CWQG categorization for the stream reference stations based on mean aqueous total phosphorus concentrations generally ranging between 4 – 10 µg/L during each respective spring, summer and fall sampling event in 2016 (Appendix Table B.2). However, a trophic status classification of 'mesotrophic' was suggested at the Mary River GO-09 series reference area based on an aqueous total phosphorus concentration falling between 10 – 20 µg/L for these same sampling events in 2016 (Appendix Table B.3). Seasonally, chlorophyll a concentrations did not differ significantly for the reference creek stations or the Mary River GO-09 series reference stations among the spring, summer and fall sampling events (Appendix Table B.8).

Comparisons between 2015 and 2016 chlorophyll a concentrations for like-season data indicated significantly higher concentrations in 2016 than 2015 at reference creek stations for the summer sampling event, but no differences for the spring and fall sampling events (Appendix Figure B.6). At the Mary River reference stations, significantly lower and higher

Table B.7: Phytoplankton monitoring data (i.e., chlorophyll a and phaeophytin a concentrations) collected at lotic reference stations, Mary River Project CREMP, 2016.

	Station	Reference Creek Stations				Mary River Reference Stations		
		CLT-REF3	**CLT-REF4**	**MRY-REF2**	**MRY-REF3**	**G0-09-A**	**G0-09**	**G0-09-B**
Sample Collection Date	Spring	27-Jun-16	27-Jun-16	27-Jun-16	27-Jun-16	26-Jun-16	26-Jun-16	26-Jun-16
	Summer	24-Jul-16	24-Jul-16	25-Jul-16	25-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16
	Fall	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16
Chlorophyll a (µg/L)	Spring	0.18	0.17	0.14	0.45	0.35	0.26	0.23
	Summer	0.41	0.31	0.56	0.37	0.29	0.24	0.22
	Fall	0.41	0.28	0.18	0.35	0.59	0.29	0.23
	Average	0.33	0.25	0.29	0.39	0.41	0.26	0.23
	Standard Deviation	0.13	0.07	0.23	0.05	0.16	0.03	0.01
	Standard Error	0.08	0.04	0.13	0.03	0.09	0.01	0.00
Phaeophytin a (µg/L)	Spring	0.28	0.29	0.28	0.45	0.39	0.35	0.31
	Summer	0.43	0.37	0.54	0.39	0.44	0.42	0.40
	Fall	0.34	0.30	0.30	0.33	0.46	0.40	0.33
	Average	0.35	0.32	0.37	0.39	0.43	0.39	0.35
	Standard Deviation	0.08	0.04	0.14	0.06	0.04	0.04	0.05
	Standard Error	0.04	0.03	0.08	0.03	0.02	0.02	0.03

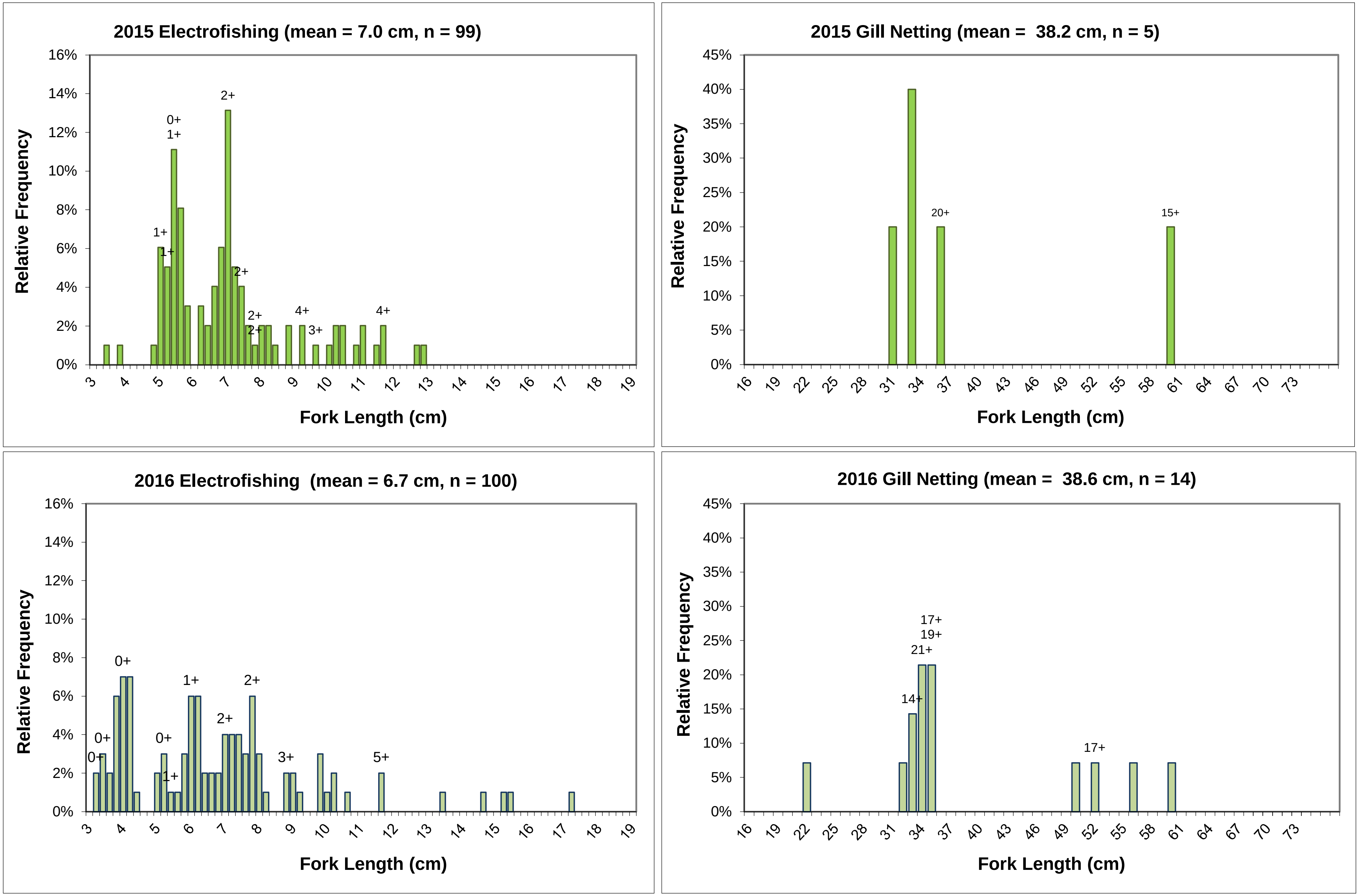


Figure B.8: Length-frequency distributions for Arctic charr captured by backpack electrofishing and gill netting at Reference Lake 3 in August 2015 and August 2016, Mary River Project CREMP. Fish ages are shown above the bars, where available.

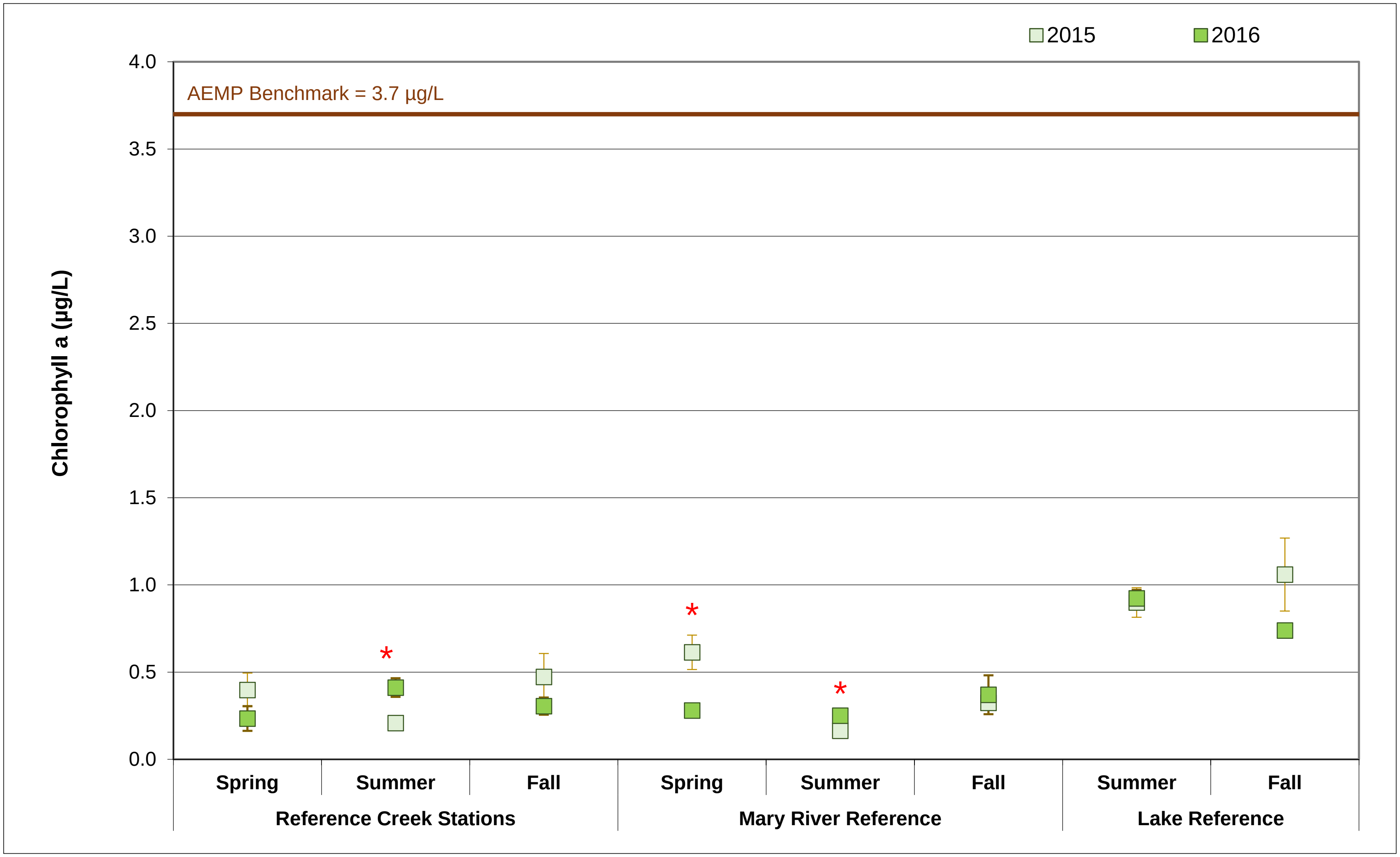


Figure B.6: Chlorophyll a concentration seasonal comparison between 2015 and 2016 at creek, river and lake reference phytoplankton monitoring stations, Mary River Project CREMP. Asterisks above data points indicate a significant difference between years for indicated season.

chlorophyll a concentrations were shown in spring and summer, respectively, during the 2016 sampling events compared to 2015 (Appendix Figure B.6). The variability in response among seasons between years at the lotic reference areas suggested that chlorophyll a concentrations exhibit naturally high spatial and temporal variability within the Mary River Project mine LSA.

B.4.2 Lentic Environments (Reference Lake 3)

Chlorophyll a concentrations at Reference Lake 3 showed no consistent differences between the surface and the bottom of the water column at each individual station during both the summer and fall sampling events in 2016 (Appendix Figure B.7). Chlorophyll a concentrations did not differ significantly between the surface and the bottom of the water column among Reference Lake 3 stations for either the summer or fall sampling events, suggesting similar phytoplankton abundance near the surface and bottom of the lake stations regardless of differences in depth.

Reference Lake 3 chlorophyll a concentrations averaged 0.92 µg/L in summer and 0.74 µg/L in fall 2016, and were consistently well below the AEMP benchmark of 3.7 µg/L (Appendix Figure B.7). Similar to the lotic reference stations, mean chlorophyll a concentrations observed at Reference Lake 3 in 2016 suggested low (i.e., oligotrophic) phytoplankton productivity based on the lake trophic status classification presented in Wetzel (2001). This trophic status classification was also consistent with an 'oligotrophic' CWQG categorization for Reference Lake 3 based on mean aqueous total phosphorus concentrations typically ranging between 4 and 10 µg/L during the summer and fall sampling events in 2016 (Appendix Table B.4). Chlorophyll a concentrations were significantly higher in summer compared to the fall at Reference Lake 3 in 2016 (Appendix Table B.8), which differed from results of the 2015 study in which chlorophyll a concentrations were statistically comparable between the summer and fall seasons (Appendix Figure B.6). Although chlorophyll a concentrations were generally comparable between the 2015 and 2016 studies for like seasons at Reference Lake 3, the relative seasonal changes in chlorophyll a concentrations suggested naturally variable temporal patterns in phytoplankton abundance can expected at Mary River Project mine LSA lakes.

B.5 Benthic Invertebrate Community

B.5.1 Creek/Tributary Environments

The original Mary River Project CREMP design had not included/identified a reference creek from which to evaluate potential mine-related effects on benthic invertebrate communities of creek/tributary environments, instead relying solely on a before-after

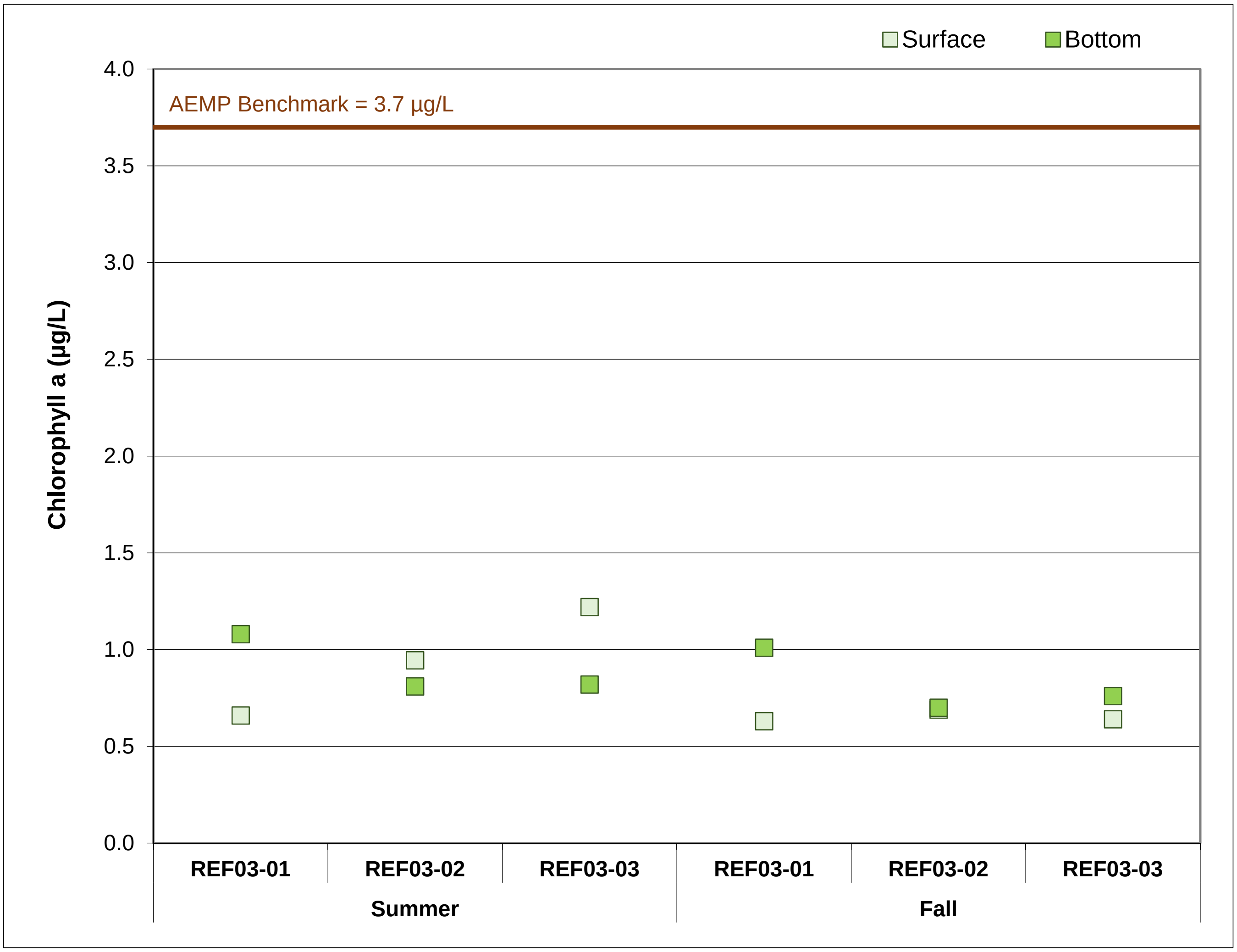


Figure B.7: Chlorophyll a concentrations at the surface and bottom of the water column at Reference Lake 3 phytoplankton monitoring stations during summer and fall sampling events, Mary River Project CREMP, 2016.

approach to identify potential mine influences on benthic invertebrates over time (see NSC 2014). Stemming from recommendations from the 2015 CREMP (Minnow 2016b), a reference creek was incorporated into the 2016 CREMP benthic invertebrate community study component to provide a stronger basis for evaluating potential within-year mine-related effects to biota residing in mine-exposed tributaries of Camp and Sheardown lakes. The benthic invertebrate community (benthic) study area selected for the 2016 CREMP was located within at the same unnamed tributary to Angajurjualuk Lake that is used for reference water quality sampling (Stations CLT-REF4 and MRY-REF2; Table 2.5; Figure 2.4). Criteria used for the selection of this creek as a reference area for the CREMP, which is herein referred to as Unnamed Reference Creek, included a watercourse exhibiting similar habitat characteristics (e.g., width, water velocity, substrate size) as the mine-exposed tributaries (see Appendix Table F.1) that is not/has not been influenced by mining or adverse anthropogenic disturbances. The acceptance of Unnamed Reference Creek as a reference area for the evaluation of mine-related influences on tributary water chemistry under the original CREMP (KP 2014a) was also considered an important criterion in the selection of this watercourse as a suitable reference area for the benthic invertebrate community survey.

Benthic invertebrate density at Unnamed Reference Creek ranged from 670 – 2,179 individuals/m^2, which is considered moderate to high for Arctic streams (Craig and McCart 1975). Unnamed Reference Creek also showed moderate richness and Simpson's Evenness, which was consistent with low production in Arctic streams as a result of constraints associated with naturally low seasonal temperatures and nutrients, as well as food limitation (Huryn and Wallace 2000). Chironomidae (non-biting midges) were the dominant group observed among the Unnamed Reference Creek benthic stations, with the relative abundance of this group ranging from 57 – 81% of individuals (mean of 71%), of which 5 – 19% were represented by metal-sensitive taxa among stations (Appendix Table B.9). Collector-gatherers were the dominant benthic invertebrate functional feeding group (FFG) present at Unnamed Reference Creek (Appendix Table B.9), suggesting greatest reliance upon deposited fine particulate organic matter as a food source for benthic invertebrates. Shredders constituted a moderate proportion of the Unnamed Reference Creek benthic invertebrate community (Appendix Table B.9), suggesting that live and/or decomposing leaf material was also an important food source. In terms of benthic invertebrate habitat preference groups (HPG), clingers and sprawlers were co-dominant groups at Unnamed Reference Creek (Appendix Table B.9) suggesting that most invertebrates were associated with substrate surfaces and were not deeply embedded in the substrate (i.e., non-burrowers).

Table B.9: Benthic invertebrate community summary statistics for Unnamed Reference Creek and Mary River (GO-09) reference areas, Mary River Project CREMP, August 2016.

Metric	Area	Sample Size	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
						Lower Bound	Upper Bound		
Density (no. organisms / m^2)	Unnamed Reference Creek	5	1,645	619	277	876	2,414	670	2,179
	Mary River GO-09 Reference	5	662	320	143	265	1,059	334	1,162
Richness (Number of Taxa)	Unnamed Reference Creek	5	18.6	0.9	0.4	17.5	19.7	17.0	19.0
	Mary River GO-09 Reference	5	14.0	1.6	0.7	12.0	16.0	12.0	16.0
Simpson's Evenness	Unnamed Reference Creek	5	0.873	0.070	0.031	0.786	0.960	0.764	0.940
	Mary River GO-09 Reference	5	0.907	0.023	0.010	0.878	0.935	0.875	0.932
Bray-Curtis Index	Unnamed Reference Creek	5	0.237	0.130	0.058	0.076	0.398	0.092	0.437
	Mary River GO-09 Reference	5	0.277	0.097	0.043	0.156	0.397	0.142	0.385
Oligochaeta (% of community)	Unnamed Reference Creek	5	2.5%	0.5%	0.2%	1.9%	3.2%	2.0%	3.3%
	Mary River GO-09 Reference	5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hydracarina (% of community)	Unnamed Reference Creek	5	11.7%	3.8%	1.7%	7.1%	16.4%	9.0%	18.2%
	Mary River GO-09 Reference	5	4.8%	2.1%	1.0%	2.2%	7.5%	2.5%	7.3%
Chironomidae (% of community)	Unnamed Reference Creek	5	70.8%	9.2%	4.1%	59.4%	82.2%	56.6%	81.4%
	Mary River GO-09 Reference	5	84.2%	4.6%	2.1%	78.4%	90.0%	78.2%	88.3%
Metal Sensitive Chironomidae (% of community)	Unnamed Reference Creek	5	8.9%	5.9%	2.7%	1.6%	16.3%	4.6%	19.3%
	Mary River GO-09 Reference	5	23.4%	12.3%	5.5%	8.1%	38.6%	11.5%	43.3%
Tipulidae (% of community)	Unnamed Reference Creek	5	4.3%	2.6%	1.2%	1.1%	7.6%	1.8%	8.5%
	Mary River GO-09 Reference	5	1.9%	1.6%	0.7%	0.0%	3.9%	0.0%	4.2%
Shredder FFG (% of community)	Unnamed Reference Creek	5	25.4%	3.2%	1.5%	21.4%	29.5%	20.4%	28.2%
	Mary River GO-09 Reference	5	12.0%	3.7%	1.6%	7.5%	16.6%	7.8%	15.3%
Collector-Gatherer FFG (% of community)	Unnamed Reference Creek	5	53.9%	7.5%	3.4%	44.5%	63.2%	44.6%	64.6%
	Mary River GO-09 Reference	5	75.4%	9.1%	4.1%	64.0%	86.7%	61.8%	84.2%
Filterer FFG (% of community)	Unnamed Reference Creek	5	2.9%	1.1%	0.5%	1.5%	4.2%	1.0%	3.8%
	Mary River GO-09 Reference	5	7.3%	4.3%	1.9%	2.0%	12.6%	2.1%	13.4%
Clinger HPG (% of community)	Unnamed Reference Creek	5	41.0%	7.1%	3.2%	32.2%	49.8%	30.9%	47.0%
	Mary River GO-09 Reference	5	22.3%	8.7%	3.9%	11.4%	33.1%	13.3%	34.9%
Sprawler HPG (% of community)	Unnamed Reference Creek	5	50.4%	8.8%	3.9%	39.5%	61.3%	39.4%	62.9%
	Mary River GO-09 Reference	5	73.7%	8.3%	3.7%	63.4%	83.9%	61.8%	81.0%
Burrower HPG (% of community)	Unnamed Reference Creek	5	8.6%	3.6%	1.6%	4.2%	13.0%	5.9%	14.5%
	Mary River GO-09 Reference	5	4.1%	2.0%	0.9%	1.5%	6.6%	1.2%	6.3%

B.5.2 River Environments

The area of Mary River located upstream of the mine lease property has been considered representative of reference conditions for the mine-exposed stations/study areas situated farther downstream on the Mary River under the CREMP (Baffinland 2014; KP 2014a,b, 2015; NSC 2014). As in previous CREMP studies, the GO-09 area of Mary River (including water quality stations GO-09A, GO-09 and GO-09B) was used as the benthic reference area for mine-exposed areas of Mary River as part of the 2016 CREMP (see Table 2.5; Figure 2.4).

Benthic invertebrate density at the Mary River reference area in 2016 ranged from 334 – 1,162 individuals/m^2, which is considered moderate for Arctic lotic systems (Craig and McCart 1975). Moderate richness and Simpson's Evenness also characterized the benthic invertebrate community of the Mary River reference area, and reflected naturally low Arctic stream environment productivity as a result of low ambient temperatures and nutrient levels (Huryn and Wallace 2000). Midges of the family Chironomidae were the dominant invertebrate group observed at the Mary River reference area, with the relative abundance of this group ranging from 78 – 88% of individuals (mean of 84%) and taxa considered metal-sensitive constituting 11 – 43% of the community (Appendix Table B.9). Similar to the reference creek, collector-gatherers were the dominant FFG present at the Mary River reference area (Appendix Table B.9), suggesting that fine particulate organic matter was the predominant food source for benthic invertebrates at this area. Sprawlers composed the dominant HPG at the Mary River reference area (Appendix Table B.9), which suggested that most benthic invertebrates were associated with the surface of rocky substrates.

Comparison of the Mary River reference area benthic invertebrate communities among baseline (2006, 2007) and mine-operational (2015, 2016) studies for key metrics indicated no consistent significant differences in density, richness and relative abundance of metal-sensitive chironomids between the baseline and mine-operational periods (Figure 5.6). Although Simpson's Evenness was significantly higher, and relative abundance of chironomids and FFG collector-gatherers significantly lower, for the mine-operational studies compared to the baseline studies, the direction of these differences was not consistent with an adverse change but rather suggested greater diversity and/or more even distribution of invertebrate groups and FFG for the mine-operational period (Figure 5.6). These changes in benthic invertebrate community metrics between the mine baseline and operational studies at the Mary River reference area were thus attributable to natural variability in community traits among years, and/or to artifacts associated with CREMP sampling among studies.

B.5.3 Lentic Environments (Reference Lake 3)

The benthic invertebrate community of Reference Lake 3 differed dramatically between littoral (<12 m depth) and profundal (>12 m depth) stations in 2016. As in the previous 2015 study, significantly higher benthic invertebrate density, richness and Simpson's Evenness was observed at littoral stations compared to profundal stations in 2016, most at Critical Effect Sizes outside of ± 2 SD (Appendix Table B.10). In addition, marked differences in benthic invertebrate community structure occurred between sampling depths as indicated by significantly differing Bray-Curtis Index and supported by lower relative abundance of Chironomidae (non-biting midges), FFG collector-gatherers, and HPG sprawlers at littoral stations compared to profundal stations (Appendix Table B.10). The considerable difference in benthic invertebrate community metrics and assemblage features between the littoral and profundal stations observed at Reference Lake 3 in both 2015 and 2016 validated changes implemented to the CREMP benthic invertebrate community survey in 2016. Specifically, the 2016 benthic invertebrate community survey focussed only on littoral habitat to reflect the fact that natural habitat factors that affect community assemblage at profundal areas limit the ability to interpret potential mine-related biological effects at profundal depths of the LSA lakes.

Littoral habitat of Reference Lake 3 was largely dominated by Ostracoda (seed shrimp) and Chironomid non-biting midge larvae that exhibit collector-gathering feeding habits and inhabit the sediment surface (i.e., sprawler mode of existence) in both 2015 and 2016. Comparison of littoral habitat benthic invertebrate communities at Reference Lake 3 between the 2015 and 2016 studies for key metrics indicated no significant differences in density, richness, Simpson's Evenness, Bray-Curtis Index, relative abundance of dominant FFG and HPG, and the relative abundance of all dominant groups except Ostracoda (seed shrimp; Appendix Table B.11). Although the relative abundance of seed shrimp differed between studies, the magnitude of difference was within scientifically established Critical Effect Sizes (CES), suggesting that this difference was not ecologically meaningful. Overall, this suggested that littoral habitat benthic invertebrate community features at Reference Lake 3 were relatively consistent between the 2015 and 2016 studies.

Table B.10: Benthic invertebrate community statistical comparison results between littoral and profundal stations at Reference Lake 3 Mary River Project CREMP, August 2016.

Metric	Statistical Test Results				Summary Statistics					
	Significant Difference Between Areas?	*p* -value	Statistical Analysis[a]	Magnitude of Difference [b] (No. of SD)	Area	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Density (Individuals/m^2)	***YES***	***0.015***	**ε**	***-1.4***	Reference Lake littoral	2,390	1,396	624	897	4,240
					Reference Lake profundal	452	55	24	406	543
Richness (Number of Taxa)	YES	0.000	α	-7.3	Reference Lake littoral	12.2	1.1	0.5	11.0	14.0
					Reference Lake profundal	4.2	1.5	0.7	2.0	6.0
Simpson's Evenness (E)	YES	0.000	ζ	-2.6	Reference Lake littoral	0.758	0.189	0.084	0.420	0.849
					Reference Lake profundal	0.267	0.041	0.018	0.235	0.337
Bray-Curtis Index	YES	0.000	ε	4.8	Reference Lake littoral	0.334	0.122	0.054	0.245	0.527
					Reference Lake profundal	0.921	0.011	0.005	0.907	0.933
Nemata (%)	NO	0.126	β	-	Reference Lake littoral	4.0%	5.6%	2.5%	0.0%	13.5%
					Reference Lake profundal	0.0%	0.0%	0.0%	0.0%	0.0%
Hydracarina (%)	NO	0.177	δ	-	Reference Lake littoral	3.6%	2.0%	0.9%	1.8%	6.7%
					Reference Lake profundal	2.1%	2.1%	1.0%	0.0%	4.4%
Ostracoda (%)	YES	0.000	γ	-2.4	Reference Lake littoral	46.9%	17.5%	7.8%	37.8%	78.0%
					Reference Lake profundal	5.7%	1.8%	0.8%	3.9%	8.4%
Chironomidae (%)	YES	0.000	β	2.5	Reference Lake littoral	45.4%	18.8%	8.4%	15.4%	59.2%
					Reference Lake profundal	92.2%	3.2%	1.4%	87.2%	95.9%
Metal-Sensitive Chironomidae (%)	YES	0.005	δ	**-2.1**	Reference Lake littoral	19.3%	8.3%	3.7%	7.7%	28.1%
					Reference Lake profundal	1.7%	1.7%	0.8%	0.0%	4.1%
Shredders (%)	**YES**	***0.023***	**γ**	***-1.1***	Reference Lake littoral	4.4%	3.2%	1.4%	1.1%	9.6%
					Reference Lake profundal	0.8%	1.2%	0.5%	0.0%	2.2%
Collector-Gatherers (%)	**YES**	***0.001***	**β**	***1.9***	Reference Lake littoral	75.0%	11.4%	5.1%	61.1%	89.7%
					Reference Lake profundal	97.1%	2.4%	1.1%	93.9%	100.0%
Filterers (%)	**YES**	***0.000***	**δ**	***-1.9***	Reference Lake littoral	16.1%	8.4%	3.8%	7.0%	26.4%
					Reference Lake profundal	0.0%	0.0%	0.0%	0.0%	0.0%
Clingers (%)	YES	0.007	δ	-2.3	Reference Lake littoral	19.2%	7.6%	3.4%	8.8%	28.3%
					Reference Lake profundal	2.1%	2.1%	1.0%	0.0%	4.4%
Sprawlers (%)	YES	0.000	γ	2.6	Reference Lake littoral	65.7%	12.1%	5.4%	57.2%	85.7%
					Reference Lake profundal	97.1%	2.8%	1.2%	93.9%	100.0%
Burrowers (%)	YES	0.001	γ	-2.3	Reference Lake littoral	15.1%	6.2%	2.8%	5.5%	22.2%
					Reference Lake profundal	0.8%	1.1%	0.5%	0.0%	2.0%

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - data untransformed, single factor ANOVA test validated using Mann Whitney U-test; ε - data untransformed, single factor ANOVA test validated using t-test assuming unequal variance; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted; γ - data probit transformed, single factor ANOVA test results validated using Mann-Whitney U-test; and, δ - data probit transformed, single-factor ANOVA test results validated using t-test assuming unequal variance.

[b] Magnitude calculated by comparing the difference between the reference area and effluent-exposed area means divided by the reference area standard deviation.

[c] Minimum effect size detectable calculated based on variance as square root of MSE from ANOVA and alpha = beta = 0.10.

[grey box] Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10 that were also outside of a Critical Effect Size of ±2 SD, suggesting an ecologically important difference.

BOLD Bold text values indicate significant difference between study areas based on ANOVA p-value less than 0.10, but a Critical Effect Size within ±2 SD, suggesting the difference is not ecologically meaningful.

Table B.11: Benthic invertebrate community statistical comparison results between 2015 and 2016 at littoral stations of Reference Lake 3, Mary River Project CREMP.

Metric	Statistical Test Results				Summary Statistics					
	Significant Difference Between Areas?	*p*-value	Statistical Analysis[a]	Magnitude of Difference [b] (No. of SD)	Year	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Density (Individuals/m^2)	NO	0.155	η	-	2015	1,278	888	397	553	2,819
					2016	2,390	1,396	624	897	4,240
Richness (Number of Taxa)	NO	0.838	ε	-	2015	12.6	4.1	1.8	9.0	18.0
					2016	12.2	1.1	0.5	11.0	14.0
Simpson's Evenness (E)	NO	0.257	ζ	-	2015	0.865	0.052	0.023	0.804	0.936
					2016	0.758	0.189	0.084	0.420	0.849
Bray-Curtis Index	NO	0.620	α	-	2015	0.382	0.170	0.076	0.219	0.662
					2016	0.334	0.122	0.054	0.245	0.527
Nemata (%)	NO	0.617	β	-	2015	8.1%	7.4%	3.3%	0.0%	17.2%
					2016	4.0%	5.6%	2.5%	0.0%	13.5%
Hydracarina (%)	NO	0.873	β	-	2015	4.2%	2.7%	1.2%	1.0%	7.5%
					2016	3.6%	2.0%	0.9%	1.8%	6.7%
Ostracoda (%)	***YES***	***0.044***	**γ**	***1.4***	2015	20.9%	18.5%	8.3%	4.1%	45.2%
					2016	46.9%	17.5%	7.8%	37.8%	78.0%
Chironomidae (%)	NO	0.110	β	-	2015	66.5%	18.9%	8.4%	40.6%	91.0%
					2016	45.4%	18.8%	8.4%	15.4%	59.2%
Metal-Sensitive Chironomidae (%)	NO	0.153	β	-	2015	11.4%	12.6%	5.6%	1.5%	32.2%
					2016	19.3%	8.3%	3.7%	7.7%	28.1%
Shredders (%)	***YES***	***0.043***	**δ**	***1.3***	2015	1.4%	2.4%	1.1%	0.0%	5.5%
					2016	4.4%	3.2%	1.4%	1.1%	9.6%
Collector-Gatherers (%)	NO	0.335	β	-	2015	81.4%	17.1%	7.7%	53.7%	95.2%
					2016	75.0%	11.4%	5.1%	61.1%	89.7%
Filterers (%)	NO	0.256	β	-	2015	11.4%	12.6%	5.6%	1.5%	32.2%
					2016	16.1%	8.4%	3.8%	7.0%	26.4%
Clingers (%)	NO	0.248	β	-	2015	13.5%	11.8%	5.3%	4.0%	33.9%
					2016	19.2%	7.6%	3.4%	8.8%	28.3%
Sprawlers (%)	NO	0.619	γ	-	2015	70.1%	14.9%	6.7%	47.1%	84.3%
					2016	65.7%	12.1%	5.4%	57.2%	85.7%
Burrowers (%)	NO	0.750	β	-	2015	16.4%	6.8%	3.0%	8.3%	25.8%
					2016	15.1%	6.2%	2.8%	5.5%	22.2%

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - data untransformed, single factor ANOVA test validated using Mann Whitney U-test; ε - data untransformed, single factor ANOVA test validated using t-test assuming unequal variance; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted; γ - data probit transformed, single factor ANOVA test results validated using Mann-Whitney U-test; and, δ - data probit transformed, single-factor ANOVA test results validated using t-test assuming unequal variance.

[b] Magnitude calculated by comparing the difference between the reference area and effluent-exposed area means divided by the reference area standard deviation.

[c] Minimum effect size detectable calculated based on variance as square root of MSE from ANOVA and alpha = beta = 0.10.

[shaded box] Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10 that were also outside of a Critical Effect Size of ±2 SD, suggesting an ecologically important difference.

BOLD Bold text values indicate significant difference between study areas based on ANOVA p-value less than 0.10, but a Critical Effect Size within ±2 SD, suggesting the difference is not ecologically meaningful.

B.6 Fish Population Survey

B.6.1 Lotic Environments

Fish population sampling of lotic habitats is not required as part of the Mary River Project CREMP (see NSC 2014). In part, this reflects the fact that fish can only inhabit LSA creeks/rivers for a short period each year (i.e., July – September) as a result of complete freezing/desiccation of these lotic habitats over much of the year, and because sampling of juvenile Arctic charr within a representative lotic habitat is conducted for the federal Environmental Effects Monitoring (EEM) program under the Metal Mining Effluent Regulations (Baffinland 2014; Minnow 2016c).

B.6.2 Lentic Environments (Reference Lake 3)

The Reference Lake 3 fish community was composed of Arctic charr and ninespine stickleback. As in 2015, the relative abundance of both species appeared to be low at Reference Lake 3 based on low electrofishing and gill netting catches and catch-per-unit-effort (CPUE) for each species in 2016 (Appendix Tables G.1 and G.2). Suitable numbers of Arctic charr were captured at nearshore habitat of Reference Lake 3 (i.e., 101 individuals) to allow evaluation of mine-related effects on survival, growth and condition of fish collected at the mine-exposed lake shorelines. For these fish, young-of-the-year (YOY) individuals were generally distinguishable from the 1^+ to 5^+ age classes at a fork length of 5.0 cm based on the evaluation of length-frequency distributions coupled with supporting age determinations (Appendix Figure B.8). In 2015, YOY Arctic charr captured at nearshoere habitat were not able to be distinguished from older age classes at Reference Lake 3 (Appendix Figure B.8). Therefore, population comparisons of nearshore Arctic charr captured between the mine-exposed and reference lakes in 2016 were completed separately for YOY and non-YOY data sets (2016 data), and using the full data set (to allow comparability between the 2015 and 2016 studies). Temporal comparisons of the 2015 and 2016 nearshore Arctic charr data did not indicate any significantly differing population endpoints that were not also outside of accepted CES (Appendix Table B.12). This not only indicated relatively good continuity in fish population features at Reference Lake 3 year-to-year supporting its use as a suitable reference lake for the CREMP, but also indicated that fish population CES that are generally used for EEM under the MMER are relevant, and could be suitably applied, to the Mary River Project CREMP.

Very low numbers of Arctic charr were captured at littoral/profundal areas of Reference Lake 3 in 2016 (i.e., 14 individuals; Appendix Table G.2). Due to the small sample size,

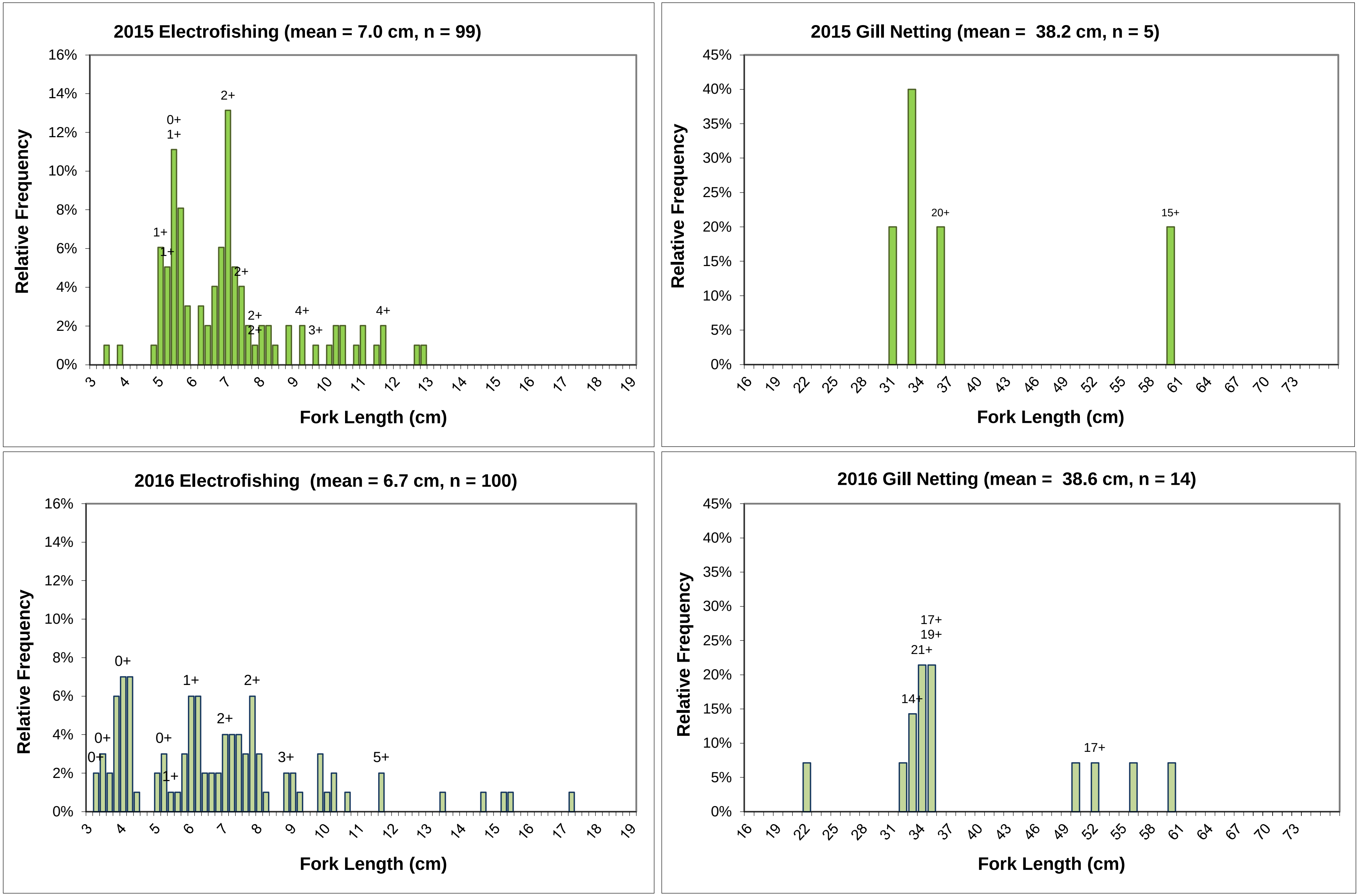


Figure B.8: Length-frequency distributions for Arctic charr captured by backpack electrofishing and gill netting at Reference Lake 3 in August 2015 and August 2016, Mary River Project CREMP. Fish ages are shown above the bars, where available.

Table B.12: Results of fish population endpoint statistical comparisons for nearshore (juvenile) Arctic charr captured at Reference Lake 3 in August 2015 and August 2016, Mary River Project CREMP.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (*p*-value)		Power
					2015		2016					
	Parameter	Covariate	2015	2016	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	99	99	-	-	-	-	K-S Test	Yes	0.002	-
	Log_{10} Age (years)	none	11	10	-	-	-	-	ANOVA	No	0.177	-
Energy Use	Log_{10} Body Weight (g)	none	99	99	-	-	-	-	ANOVA	Yes	0.075	0.555
	Log_{10} Fork Length (cm)	none	99	99	-	-	-	-	ANOVA	Yes	0.065	0.582
	Log_{10} Body Weight (g)	Log_{10} Age (years)	11	10	0.732	0.001	0.930	0.000	ANCOVA	No	0.522	-
	Log_{10} Body Weight (g)	Log_{10} Age (years)[e]	9	9	0.991	0.000	0.980	0.000	ANCOVA	Yes	0.000	-
	Log_{10} Fork Length (cm)	Log_{10} Age (years)	11	10	0.743	0.001	0.903	0.000	ANCOVA	No	0.957	-
	Log_{10} Fork Length (cm)	Log_{10} Age (years)[e,f]	8	9	0.996	0.000	0.978	0.000	ANCOVA	Yes	0.001	-
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)	99	99	0.989	0.000	0.989	0.000	ANCOVA	No	0.572	-

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]		Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	2015	2016		2015	2016			Increase	Decrease
Survival	Age (years)	none	11	10	Mean	1.6	0.9	-		277.9	-73.5
Energy Use	Body Weight (g)	none	99	99	Mean	2.619	2.022	-22.8		-	-
	Fork Length (cm)	none	99	99	Mean	6.8	6.2	-8.3		-	-
	Body Weight (g)	Age (years)	11	10	Adjusted Mean	2.821	3.285	-		82.2	-45.1
	Body Weight (g)	Age (years)[e]	9	9	Predicted Values	11.953	9.479	Max overlap	-20.7	-	-
						1.004	1.722	Min overlap	71.5		
	Fork Length (cm)	Age (years)	11	10	Adjusted Mean	7.0	7.1	-		23.3	-18.9
	Fork Length (cm)	Age (years)[e,f]	8	9	Predicted Values	11.3	10.1	Max overlap	-11.3	-	-
						5.0	5.7	Min overlap	13.2		
Energy Storage	Body Weight (g)	Fork Length (cm)	99	99	Adjusted Mean	2.295	2.313	-		4.6	-4.4

[shaded] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[e] Studentized outliers REF3-ACJ-1, REF3 ACJ-96, and REF316-ACJ-8 removed.

[f] Studentized outlier REF3-ACJ-2 removed.

meaningful evaluation of mine-related effects on the population of reproductive-aged Arctic charr was not possible using data from the mine-exposed lakes and Reference Lake 3 in 2016. Because Arctic charr can show differential growth rates between the sexes (females grow faster; Jonsson et al. 1999; Skulason et al. 1996; Gulseth and Nilssen 2001), natural differences in sex ratios between study areas could potentially result in falsely attributing differences in growth and/or condition between mine-exposed and reference areas to mine-related influences. Thus, the inability to definitively determine Arctic charr sex using external characteristics when applying a non-lethal sampling approach could confound data interpretation. To determine whether differences in sex ratios could potentially confound the interpretation of the CREMP Arctic charr health assessment, growth and condition were compared between male and female Arctic charr collected at Camp, Sheardown and Mary lakes during the baseline period as part of the 2015 CREMP (Minnow 2016a). No significant differences in growth and condition were indicated between males and females based on this analysis, suggesting that a non-lethal study approach is unlikely to bias the evaluation of mine-related effects on fish health as part of the CREMP. Contrary to the published literature, the absence of any differences in Arctic charr growth and condition between males and females at Mary River Project LSA lakes may be explained by naturally slow growth rates and low spawning frequency (i.e., once every 2 – 4 years) at high Arctic areas, and also by low gonadosomatic index (GSI) at the time that sampling is normally conducted for the Mary River Project CREMP (i.e., August).

B.7 Implications for the Mary River Project CREMP

This overview of reference conditions was included to provide context and perspective regarding key chemical, physical and biological features of the CREMP reference study areas. Key implications of reference area features affecting the CREMP the evaluation of potential mine-related effects at mine-exposed waterbodies that were identified through this reference area overview include the following:

- **Federal Water Quality Guidelines (WQG) not applicable for aqueous phenol concentrations**. Aqueous concentrations of phenols were routinely elevated above WQG at the CREMP creek, river and lake reference stations in 2015 and 2016. Correlation analysis consistently indicated a significant, positive relationship between phenol and both nitrate and DOC concentrations, suggesting that high phenol concentrations in waterbodies near the Mary River Project mine were associated with influences from natural organic composition. Therefore, phenol concentration comparisons against applicable WQG did not serve as a focus for discussion as part of the 2016 CREMP.

- **Greater reliance on the use of dissolved metals concentrations for assessing mine-related influences on aqueous metal concentrations at waterbodies used for the CREMP**. Total aluminum concentrations were routinely elevated, and other metals including (total) iron and manganese periodically elevated, above WQG at creek, river and/or lake reference areas used for the CREMP in 2015, 2016, and historically as part of baseline studies. Significant positive correlations between total concentrations of these metals and turbidity were identified using the 2015 and 2016 data sets which suggested that these metals were likely bound to and/or composed suspended particulate materials in water samples. This was supported by a low ratio of dissolved to total metal concentrations for the reference water samples in 2015 and 2016. Accordingly, greater emphasis was placed on comparison of dissolved metal concentrations for assessing potential mine-related influences on water quality for the 2016 CREMP analysis.
- **Use of fall sampling event water quality data to allow the most conservative evaluation of potential mine-related influences on water chemistry.** Water chemistry at lotic reference stations showed distinct seasonal changes in parameter concentrations during the baseline, 2015 and 2016 studies. In general, conventional parameters, ions and total metals were observed at lowest concentrations in spring, with intermediate concentrations in the summer and highest concentrations observed during the fall sampling event. Therefore, although water chemistry data from winter, spring and summer sampling events were examined, the fall water chemistry data generally served as the focus for the evaluation of potential mine-related influences on water quality at the mine-exposed lakes in 2016.
- **Use of average water chemistry and chlorophyll a data for lake water quality/phytoplankton monitoring stations**. No consistent differences in water chemistry or chlorophyll a concentrations were observed between the surface and bottom of the water column at Reference Lake 3 stations in 2015 or 2016. Therefore, the evaluation of water chemistry and phytoplankton productivity among stations and study areas for the 2016 Mary River Project CREMP was based on average water chemistry and chlorophyll a values, respectively, from the water column surface and bottom for each lake station.
- **Discontinue creek sediment chemistry monitoring**. Lotic habitats included in the Mary River Project CREMP contain minimal depositional habitat based on

investigations conducted during baseline (2005 – 2013), mine construction (2014) and mine-operational (2015, 2016) studies. The general lack of any substantial accumulation of fine sediments within these watercourses precludes any meaningful assessment of potential mine-related influences on sediment chemistry. Therefore, no sediment chemistry sampling was conducted at lotic environments as part of the 2016 CREMP.

- **Focus lake benthic invertebrate community survey on littoral zone**. Benthic invertebrate community data collected at Reference Lake 3 in 2015 and 2016 indicated that, similar to most lakes, benthic invertebrate community features can be expected to naturally change with depth. In general, as depth increases, lower benthic invertebrate density and richness typically occurs. The occurrence of naturally low density and/or richness can, in turn, limit the ability to distinguish adverse effects associated with a project. Therefore, in order to maximize the confidence in the benthic invertebrate community analysis results, the littoral zone served as the focus for the lake benthic invertebrate community survey as part of the 2016 CREMP.

APPENDIX C

WATER QUALITY DATA

Table C.1: *In-situ* water quality data collected from lotic environments for the Mary River Project CREMP, spring 2016.

Study Area		Station	Sampling Date	*In-situ* Water Quality Parameter				
				Temperature (°C)	Dissolved Oxygen (% saturation)	pH	Conductivity (µS/cm)	Turbidity (NTU)
Camp Lake System	Reference Creek Stations	CLT-REF4	27-Jun-16	3.0	103.6	7.41	25.3	0.70
		CLT-REF3	27-Jun-16	2.8	103.5	7.20	39.7	0.50
		MRY-REF3	27-Jun-16	2.0	104.6	7.79	18.3	2.40
		MRY-REF2	27-Jun-16	5.0	104.0	7.44	44.5	0.50
	CLT-1	L1-08	27-Jun-16	2.3	102.4	7.28	44.0	1.40
		L1-02	27-Jun-16	4.1	101.8	7.42	60.8	-
		L2-03	27-Jun-16	5.0	96.2	7.22	246.8	2.80
		L1-09	27-Jun-16	4.5	100.4	7.48	71.4	1.60
		L1-05	27-Jun-16	5.0	100.2	7.27	75.2	1.20
		L0-01	27-Jun-16	6.5	102.8	6.75	84.0	1.30
	CLT-2	K0-01	25-Jun-16	8.4	98.5	7.21	77.5	1.00
	Camp Lake	J0-01	26-Jun-16	4.6	103.8	7.16	127.0	0.10
Sheardown Lake System	SDL Tribs	D1-05	27-Jun-16	5.1	95.9	7.67	154.7	0.50
		D1-00	27-Jun-16	6.1	12.3	7.55	185.3	1.70
Mary River/Lake System	Tom River	I0-01	25-Jun-16	6.8	103.8	7.07	31.5	2.40
	Mary River	G0-09-A	26-Jun-16	1.2	98.2	7.58	20.4	8.20
		G0-09	26-Jun-16	1.6	99.0	7.58	21.4	5.80
		G0-09-B	26-Jun-16	1.4	99.5	7.82	26.1	3.70
		G0-03	25-Jun-16	5.2	100.6	7.07	22.0	4.50
		G0-01	26-Jun-16	2.6	102.7	7.51	22.4	2.90
		F0-01	26-Jun-16	2.2	100.5	7.34	44.0	6.10
		E0-10	26-Jun-16	2.7	102.4	7.10	27.7	3.70
		E0-03	26-Jun-16	2.2	102.3	7.54	23.6	2.80
		E0-20	25-Jun-16	4.7	102.5	7.22	21.9	2.60
		E0-21	25-Jun-16	4.8	102.0	7.20	20.7	3.30
		C0-10	25-Jun-16	4.3	102.7	7.40	22.7	2.36
		C0-05	25-Jun-16	4.3	105.4	7.54	33.3	2.60
		C0-01	25-Jun-16	4.6	105.4	8.15	30.8	2.80

Table C.2: *In-situ* water quality data collected from lotic environments for the Mary River Project CREMP, summer 2016.

Study Area		Station	Sampling Date	*In-situ* Water Quality Parameter				
				Temperature (°C)	Dissolved Oxygen (% saturation)	pH	Conductivity (µS/cm)	Turbidity (NTU)
Camp Lake System	Reference Creek Stations	CLT-REF4	24-Jul-16	7.90	99.7	7.9	80.7	0.9
		CLT-REF3	24-Jul-16	6.20	100.8	7.75	72.2	-1.7
		MRY-REF3	25-Jul-16	7.70	101.0	7.33	64.6	8.2
		MRY-REF2	25-Jul-16	8.80	102.4	7.55	96.4	-1.5
	CLT-1	L1-08	20-Jul-16	5.00	100.8	7.83	84.4	1.4
		L1-02	19-Jul-16	7.70	99.2	7.96	147.2	0.3
		L2-03	19-Jul-16	8.20	96.6	7.81	371.2	2.2
		L1-09	19-Jul-16	8.20	99.0	7.95	211.3	0.7
		L1-05	20-Jul-16	10.90	100.8	8.11	210.1	0.3
		L0-01	20-Jul-16	11.10	100.7	8.14	219.2	0.3
	CLT-2	K0-01	20-Jul-16	9.70	100.1	8.02	186.5	0.9
	Camp Lake	J0-01	20-Jul-16	9.20	106.5	7.84	132.1	0.5
Sheardown Lake System	SDL Tribs	D1-05	19-Jul-16	6.40	93.2	7.64	280.4	0.3
		D1-00	19-Jul-16	9.00	-	7.66	310.5	1
Mary River/Lake System	Tom River	I0-01	20-Jul-16	9.40	103.1	7.92	88.5	1.4
	Mary River	G0-09-A	18-Jul-16	9.40	98.7	7.72	57.4	10.4
		G0-09	18-Jul-16	8.90	95.7	7.73	65.9	8.2
		G0-09-B	18-Jul-16	9.20	95.7	7.84	62.1	8.3
		G0-03	18-Jul-16	9.40	95.7	7.79	62.6	6.3
		G0-01	18-Jul-16	8.90	97.3	7.72	64.0	5.8
		F0-01	18-Jul-16	7.30	97.0	8.08	154.6	3.6
		E0-10	18-Jul-16	8.60	98.9	7.8	84.2	6.1
		E0-03	18-Jul-16	8.10	99.0	7.7	69.6	6.1
		E0-20	18-Jul-16	9.40	100.4	7.7	67.6	6.4
		E0-21	18-Jul-16	8.70	100.0	7.7	64.9	6.4
		C0-10	18-Jul-16	9.30	101.8	7.72	66.3	6.7
		C0-05	18-Jul-16	10.80	100.7	7.7	67.5	7.2
		C0-01	18-Jul-16	11.40	99.6	7.57	-	-

Table C.3: *In-situ* water quality data collected from lotic environments for the Mary River Project CREMP, fall 2016.

Study Area		Station	Sampling Date	*In-situ* Water Quality Parameter				
				Temperature (^{o}C)	Dissolved Oxygen (% saturation)	pH	Conductivity (µS/cm)	Turbidity (NTU)
Camp Lake System	Reference Creek Stations	CLT-REF4	20-Aug-16	4.0	96.0	7.81	98.0	-2.0
		CLT-REF3	20-Aug-16	6.9	96.2	8.11	115.0	-2.1
		MRY-REF3	20-Aug-16	11.1	98.0	7.93	115.0	-1.0
		MRY-REF2	20-Aug-16	8.2	97.3	7.92	92.0	4.6
	CLT-1	L1-08	20-Aug-16	1.5	91.6	7.62	125.0	-2.4
		L1-02	19-Aug-16	4.6	95.9	8.01	212.9	-2.7
		L2-03	19-Aug-16	6.6	95.8	7.94	441.3	0.3
		L1-09	19-Aug-16	5.8	97.1	8.04	302.4	-2.0
		L1-05	19-Aug-16	4.1	96.7	8.01	307.6	-2.0
		L0-01	19-Aug-16	4.0	96.1	8.05	305.6	-1.9
	CLT-2	K0-01	19-Aug-16	3.7	95.4	8.09	263.4	-2.8
	Camp Lake	J0-01	20-Aug-16	10.0	93.0	6.77	114.0	-2.5
Sheardown Lake System	SDL Tribs	D1-05	19-Aug-16	4.1	92.5	7.75	239.2	-2.5
		D1-00	19-Aug-16	5.2	95.8	7.94	314.5	4.9
Mary River/Lake System	Tom River	I0-01	19-Aug-16	7.8	99.9	8.10	196.7	-2.8
	Mary River	G0-09-A	20-Aug-16	8.7	95.3	8.12	160.0	18.6
		G0-09	20-Aug-16	8.8	96.4	8.15	159.0	8.6
		G0-09-B	20-Aug-16	8.6	96.2	8.11	159.0	9.2
		G0-03	20-Aug-16	5.8	95.5	7.95	142.0	11.4
		G0-01	20-Aug-16	4.5	94.4	7.52	148.0	15.9
		F0-01	20-Aug-16	5.3	95.7	8.14	225.0	10.7
		E0-10	20-Aug-16	4.8	96.4	7.98	157.0	16.5
		E0-03	19-Aug-16	7.2	96.5	8.04	176.0	13.7
		E0-20	19-Aug-16	7.2	97.5	8.08	175.1	16.3
		E0-21	19-Aug-16	6.9	97.2	8.07	175.7	14.7
		C0-10	19-Aug-16	8.9	98.8	8.15	173.3	35.9
		C0-05	19-Aug-16	8.0	101.6	8.03	172.6	51.1
		C0-01	19-Aug-16	8.4	99.5	8.07	172.5	15.1

Table C.4: Dissolved metals concentrations at reference creek monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Spring Sampling Event				Summer Sampling Event				Fall Sampling Event			
			CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2	CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2	CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2
			L1790501-27	L1790501-28	27-Jun-2016	27-Jun-2016	27-Jun-2016	27-Jun-2016	24-Jul-2016	24-Jul-2016	25-Jul-2016	25-Jul-2016	20-Aug-2016	20-Aug-2016
Dissolved Metals	Aluminum (Al)	mg/L	0.0065	0.0091	0.0273	0.0051	0.0119	0.0079	0.0336	0.0078	0.0082	0.0081	0.0244	0.0100
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00110	0.00212	0.00201	0.00192	0.00357	0.00450	0.00527	0.00538	0.00555	0.00628	0.00999	0.00816
	Beryllium (Be)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	2.11	3.35	1.30	3.71	8.10	7.02	4.69	9.32	14.3	11.8	9.20	13.6
	Cesium (Cs)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010								
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	0.0205	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	<0.00020	0.00063	0.00063	0.00170	<0.00050	0.00092	0.00085	<0.00050	0.00063	0.00107	0.00100	0.00072
	Iron (Fe)	mg/L	<0.010	<0.010	0.027	0.451	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	0.000056	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	1.23	1.97	0.657	2.19	4.60	4.03	2.36	5.43	7.67	6.63	4.46	7.78
	Manganese (Mn)	mg/L	<0.00050	<0.00050	0.00168	0.0057	0.0001	0.000574	0.000244	0.000416	0.000087	0.00113	0.000117	0.000505
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	<0.000050	0.000125	0.000064	0.000229	0.000117	0.000406	0.000236	0.000143	0.000329	0.000639	0.000429	0.000242
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	0.00106	<0.00050	0.00050	<0.00050	<0.00050	<0.00050	0.00067	<0.00050	<0.00050
	Phosphorus (P)	mg/L	<0.050	<0.050	<0.050	<0.050								
	Potassium (K)	mg/L	0.190	0.292	0.249	0.284	0.465	0.52	0.62	0.62	0.67	0.75	1.02	0.87
	Rubidium (Rb)	mg/L	0.00022	0.00065	0.00041	0.00042								
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.231	0.481	0.290	0.317	0.64	0.76	0.84	0.69	0.73	0.92	1.03	0.80
	Silver (Ag)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	<0.50	<0.50	0.62	<0.50	0.587	0.570	1.72	1.08	1.27	0.985	3.48	1.56
	Strontium (Sr)	mg/L	0.0016	0.0023	0.0028	0.0028	0.00607	0.00458	0.0100	0.00761	0.0109	0.00795	0.0191	0.0108
	Sulfur (S)	mg/L	<0.50	<0.50	<0.50	<0.50								
	Tellurium (Te)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020								
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Thorium (Th)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010								
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	0.00058	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Tungsten (W)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010								
	Uranium (U)	mg/L	0.000088	0.000201	0.000194	0.000188	0.001315	0.000625	0.000382	0.000932	0.00755	0.00311	0.00145	0.00230
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0010	<0.0010	0.0032	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030								

Table C.5: *In-situ* water quality profile data collected at Reference Lake 3 water quality monitoring stations in summer[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)			Dissolved Oxygen (% Saturation)			pH (pH units)			Specific Conductance (µS/cm)		
	REF3-01[b]	REF3-02[b]	REF3-03[b]	REF3-01	REF3-02	REF3-03	REF3-01	REF3-02	REF3-03	REF3-01	REF3-02	REF3-03
1.0	8.7	9.2	8.8	106.2	107.0	105.6	7.75	7.80	7.80	78.4	73.8	73.7
2.0	8.5	9.2	8.8	106.0	107.2	106.6	7.70	7.73	7.72	78.6	73.8	73.8
3.0	8.4	9.2	8.8	105.9	107.1	106.6	7.68	7.72	7.70	78.5	73.8	73.8
4.0	8.2	9.2	8.8	106.0	106.9	106.5	7.66	7.70	7.79	78.6	73.8	73.9
5.0	7.7	9.0	8.7	105.9	105.9	106.5	7.65	7.69	7.68	78.6	73.7	73.9
6.0	7.1	7.6	8.7	105.1	105.1	106.5	7.63	7.66	7.68	76.5	73.8	73.9
7.0	7.0	7.4	8.7	104.8	105.1	105.0	7.61	7.65	7.68	78.5	73.8	73.8
8.0	6.9	7.4	7.7	104.6	105.0	104.7	7.60	7.65	7.67	78.6	73.7	74.0
9.0	6.9	7.1	7.4	104.2	104.2	104.7	7.59	7.63	7.66	78.7	73.7	73.8
10.0	6.8	6.8	7.3	103.9	103.4	104.3	7.59	7.61	7.64	78.6	73.4	73.8
11.0	6.8	6.6	7.1	103.7	103.1	104.4	7.58	7.59	7.64	78.7	73.8	73.7
12.0	6.7	6.5	7.0	103.5	103.2	104.3	7.58	7.57	7.62	78.6	73.8	73.8
13.0	6.6	6.5	7.7	103.5	103.1	104.7	7.56	7.56	7.61	78.6	73.8	74.0
14.0	6.5	6.5	6.9	103.4	103.0	103.6	7.55	7.55	7.60	78.6	73.8	73.8
15.0		6.5	6.9		102.9	103.4		7.54	7.59		73.8	73.8
16.0		6.5	6.9		102.9	103.4		7.54	7.59		73.8	73.8
17.0		6.5	6.8		102.9	103.3		7.53	7.58		73.8	73.8
18.0		6.3	6.8		102.1	103.2		7.52	7.58		73.9	73.8
19.0			6.8			103.0			7.57			73.8
20.0			6.8			102.9			7.65			73.8
21.0			6.7			102.7			7.55			73.8
22.0			6.7			102.5			7.55			73.8
23.0			6.6			102.3			7.54			73.8
24.0			6.6			102.2			7.53			73.8
25.0			6.5			102.1			7.52			73.3
26.0			6.4			101.5			7.50			73.9
27.0			6.1			101.4			7.50			73.9
28.0			6.0			101.5			7.48			73.3
29.0			5.9			101.4			7.47			73.9
30.0			5.8			101.1			7.46			73.8
31.0			5.7			100.9			7.45			73.9

[a] Sampling conducted on 16-July (REF3-01) and 28-July (REF3-02, REF3-03), 2016.

[b] Total depth at Stations REF3-01, REF3-02, and REF3-03 were 15.1, 18.6, and 31.4 m, respectively, at the time of summer sampling.

Table C.6: *In-situ* water quality profile data collected at Reference Lake 3 water quality monitoring stations in fall[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)			Dissolved Oxygen (% Saturation)			pH (pH units)			Specific Conductance (µS/cm)		
	REF3-01[b]	REF3-02[b]	REF3-03[b]	REF3-01	REF3-02	REF3-03	REF3-01	REF3-02	REF3-03	REF3-01	REF3-02	REF3-03
1.0	11.1	11.3	10.9	96.2	100.1	102.6	7.40	7.44	7.69	48.5	47.5	47.7
2.0	11.0	11.3	10.8	98.5	100.2	101.3	7.13	7.48	7.70	47.9	47.5	47.4
3.0	11.0	11.3	10.6	98.4	100.2	101.1	7.19	7.50	7.70	47.8	47.5	47.3
4.0	10.9	11.3	10.6	98.3	100.1	100.7	7.23	7.51	7.71	47.7	47.5	47.2
5.0	10.9	11.2	10.5	98.3	100.3	100.5	7.29	7.52	7.71	47.5	47.3	47.1
6.0	10.9	11.1	10.5	98.5	99.8	100.3	7.33	7.53	7.71	47.4	47.1	47.1
7.0	10.8	11.0	10.5	98.7	100.0	100.2	7.36	7.54	7.71	37.4	47.0	47.0
8.0	10.8	11.0	10.4	98.7	99.9	100.1	7.38	7.54	7.72	47.2	46.9	47.0
9.0	10.7	10.9	10.3	99.6	99.8	99.9	7.42	7.54	7.72	47.0	46.8	46.9
10.0	10.6	10.8	10.3	99.4	99.8	99.7	7.45	7.54	7.72	47.1	46.7	46.8
11.0	10.5	10.5	10.2	98.9	100.0	99.3	7.46	7.55	7.73	46.8	46.4	46.7
12.0	8.9	8.7	9.9	98.6	99.4	98.8	7.46	7.53	7.71	45.9	44.5	46.0
13.0	8.6	7.9	9.0	99.7	101.0	100.2	7.44	7.46	7.68	44.9	43.3	45.3
14.0	7.0	7.5	8.7	97.8	99.6	100.6	7.32	7.42	7.67	43.1	43.4	45.0
15.0		7.0	8.4		99.1	100.3		7.37	7.65		42.0	44.5
16.0		6.9	8.0		98.8	99.6		7.36	7.60		41.7	43.9
17.0		6.6	7.3		98.7	99.0		7.35	7.56		41.4	43.1
18.0		6.5	7.3		98.7	98.6		7.34	7.54		41.3	43.0
19.0		6.4	7.1		98.2	98.5		7.32	7.52		41.1	42.8
20.0			7.0			98.2			7.51			42.6
21.0			6.8			97.9			7.48			42.2
22.0			6.7			97.7			7.45			42.1
23.0			6.5			97.1			7.43			42.7
24.0			6.4			96.8			7.42			41.9
25.0			6.4			96.4			7.40			41.9
26.0			6.4			96.3			7.40			41.9
27.0			6.4			96.1			7.39			41.9
28.0			6.3			95.7			7.38			41.8
29.0			6.3			95.3			7.36			41.8
29.3			6.3			95.1			7.35			41.8

[a] Sampling conducted on 19-August and 20-August, 2016.

[b] Total depth at stations REF3-01, REF3-02, and REF3-03 were 14.1, 20.7, and 30.3 m, respectively, at the time of fall sampling.

Table C.7: Sampling depth, water clarity measures, and surface and bottom *in-situ* water quality measures collected at Reference Lake 3 benthic invertebrate community stations, Mary River Project CREMP, August 2016.

Replicate ID	Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (pH units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
REF 03-1	16-Aug-16	9.0	9.0	clear, colourless	surface	12.9	8.77	83.5	7.88	75
					bottom	10.2	9.28	82.6	7.86	74
REF 03-2	16-Aug-16	8.1	8.1	clear, colourless	surface	11.8	10.50	97.0	7.19	74
					bottom	9.8	10.92	96.1	7.28	74
REF 03-3	16-Aug-16	10.0	10.0	clear, colourless	surface	12.3	10.61	99.2	7.71	74
					bottom	9.5	11.34	99.1	7.74	74
REF 03-4	16-Aug-16	8.8	8.8	clear, colourless	surface	12.5	10.89	100.4	7.80	75
					bottom	10.4	10.33	91.9	7.57	74
REF 03-5	16-Aug-16	10.7	8.5	clear, colourless	surface	11.6	10.81	99.6	7.83	74
					bottom	9.7	9.86	86.9	7.77	74
REF 03-6	16-Aug-16	19.5	8.3	clear, colourless	surface	12.8	10.19	96.1	7.86	75
					bottom	6.5	11.27	91.6	7.70	74
REF 03-7	16-Aug-16	22.9	8.0	clear, colourless	surface	12.7	8.80	82.9	7.90	75
					bottom	6.0	9.37	74.9	7.61	74
REF 03-8	16-Aug-16	18.6	8.0	clear, colourless	surface	12.4	10.28	96.3	7.87	74
					bottom	6.6	11.17	90.1	7.75	74
REF 03-9	16-Aug-16	21.6	7.8	clear, colourless	surface	12.2	10.59	98.6	7.87	74
					bottom	7.0	10.37	84.7	7.67	74
REF 03-10	16-Aug-16	19.8	8.1	clear, colourless	surface	12.5	9.88	94.4	7.88	75
					bottom	6.9	12.71	104.4	7.74	74

Table C.8: Statistical comparison of bottom *in-situ* water quality between littoral and profundal stations of Reference Lake 3, Mary River Project CREMP, August 2016.

Lake	Habitat Variable	Statistical Test Results			Summary Statistics						
		Significant Difference Between Areas?	*p*-value	Statistical Analysis[a]	Station Type	n	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Reference Lake 3	Secchi Depth (m)	YES	0.035	α	Littoral	5	8.9	0.7	0.3	8.1	10.0
					Profundal	5	8.0	0.2	0.1	7.8	8.3
	Temperature (˚C)	YES	0.000	α	Littoral	5	9.9	0.4	0.2	9.5	10.4
					Profundal	5	6.6	0.4	0.2	6.0	7.0
	Dissolved Oxygen (mg/L)	NO	0.368	α	Littoral	5	10.3	0.8	0.4	9.3	11.3
					Profundal	5	11.0	1.2	0.6	9.4	12.7
	Dissolved Oxygen (% saturation)	NO	0.710	α	Littoral	5	91.3	6.7	3.0	82.6	99.1
					Profundal	5	89.1	10.8	4.8	74.9	104.4
	pH (units)	NO	0.648	α,δ	Littoral	5	7.64	0.23	0.10	7.28	7.86
					Profundal	5	7.69	0.06	0.03	7.61	7.75
	Specific Conductance (umho/cm)	NO	1.000	α	Littoral	5	74.0	0.0	0.0	74.0	74.0
					Profundal	5	74.0	0.0	0.0	74.0	74.0

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - single factor ANOVA test results validated using Mann-Whitney U-test; and, δ - single-factor ANOVA test results validated using t-test assuming unequal variance.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table C.9: Dissolved metals concentrations at Reference Lake 3 monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Summer Sampling Event						Fall Sampling Event					
			REF3-01S1 surface 16-Jul-2016	REF3-01B1 bottom 16-Jul-2016	REF3-02S1 surface 28-Jul-2016	REF3-02B1 bottom 28-Jul-2016	REF3-03S1 surface 28-Jul-2016	REF3-03B1 bottom 28-Jul-2016	REF3-01S1 surface 20-Aug-2016	REF3-01B1 bottom 20-Aug-2016	REF3-02S1 surface 19-Aug-2016	REF3-02B1 bottom 19-Aug-2016	REF3-03-S1 surface 20-Aug-2016	REF3-03-B1 bottom 20-Aug-2016
Dissolved Metals	Aluminum (Al)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00672	0.00647	0.00661	0.00668	0.00676	0.00690	0.0063	0.0064	0.0065	0.00646	0.00649	0.00656
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	7.00	6.99	6.98	7.02	7.03	7.19	6.92	7	7.06	6.9	6.83	7.04
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00081	0.00068	0.00077	0.00075	0.00075	0.00079	0.0009	0.00081	0.00081	0.00081	0.00078	0.00093
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	0.000058	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	4.40	4.30	4.36	4.35	4.33	4.33	4.38	4.13	4.23	4.23	4.02	4.27
	Manganese (Mn)	mg/L	0.000280	0.000208	0.000253	0.000195	0.000272	0.000233	0.000244	0.000123	0.000214	0.000121	0.0002	0.000195
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000121	0.000113	0.000128	0.000112	0.000115	0.000120	0.000133	0.000128	0.000131	0.000127	0.000126	0.00013
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.91	0.89	0.90	0.89	0.89	0.90	0.89	0.88	0.87	0.88	0.86	0.89
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.42	0.44	0.43	0.45	0.43	0.45	0.4	0.4	0.38	0.44	0.4	0.47
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.864	0.850	0.849	0.852	0.841	0.847	0.84	0.828	0.829	0.838	0.816	0.85
	Strontium (Sr)	mg/L	0.00806	0.00814	0.00807	0.00811	0.00802	0.00816	0.00805	0.00822	0.00818	0.00805	0.0079	0.00822
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000252	0.000246	0.000257	0.000244	0.000252	0.000246	0.000276	0.000264	0.000282	0.00026	0.000267	0.00025
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.10: Average Relative Percent Difference (RPD) values between water chemistry samples taken at the top and bottom of the water column at lentic (lake) monitoring stations, Mary River Project CREMP, 2016. Gray shaded values indicate RDP >30%.

Parameters		Reference Lake		Camp Lake			Sheardown Lake Northwest			Sheardown Lake Southeast			Mary Lake North Basin			Mary Lake South Basin		
		Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall
Conventionals[b]	Conductivity (lab)	0.3	16	3.9	0.5	2.4	2	0	3	2.4	0.6	1.4	1.3	4.2	3.1	7.3	7.5	14
	pH (lab)	1.0	2.2	2.7	6.6	1.4	0.6	1.2	1.9	0.9	0.7	1.3	3.9	0.5	0.4	0.8	0.9	1.4
	Hardness (as $CaCO_3$)	1.9	1.9	3.2	2.8	3.2	1.9	2.0	3.2	1.3	1.4	0.9	4.5	5.3	5.2	8.5	5.8	13
	Total Suspended Solids (TSS)	13	0	6.7	0	7.3	0	0	0	0	59	16	0	0	0	0	0	3.2
	Total Dissolved Solids (TDS)	8.7	4.7	5.2	5.0	2.8	8.5	7.3	5.3	1.8	1.6	4.4	0.4	5.2	4.2	15	16	18
	Turbidity	7.3	9.1	51	37	29	63	6.1	12	35	78	9.6	74	47	19	38	18	24
	Alkalinity (as $CaCO_3$)	8.4	2.0	2.3	3.5	4.3	3.8	7.6	2.2	40	3.7	5.9	4.1	6.8	3.4	6.1	18	16
Nutrients and Organics	Total Ammonia	0	8.3	49	26	17	33	15	32	0	23	40	52	0	18	0	25	0
	Nitrate	0	0	28	0	0	27	0	14	29	22	3.6	41	0	0	19	4.6	0.7
	Nitrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Kjeldahl Nitrogen (TKN)	18	0	0	0	0	6.1	24	3.0	0	2.5	1.3	0	0	0	31	0	0
	Nitrate and Nitrite (as N)	0	0	28	0	0	27	0	14	26	21	2.7	41	0	0	19	3.2	0
	Dissolved Organic Carbon	4.5	3.7	14	2.6	4.7	12	2.5	9.6	14	7.0	13	8.5	0	5.6	11	23	7.7
	Total Organic Carbon	1.3	1.2	8.9	23	21	6.4	13	11	22	8.9	9.8	4.0	1.6	5.1	17	12	14
	Total Phosphorus	49	62	22	34	27	2.8	43	58	25	42	63	17	9.7	17	17	36	28
	Phenols	26	51	22	28	45	6.8	34	74	37	71	83	16	72	1.4	25	33	94
Anions	Bromide (Br)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chloride (Cl)	9.4	1.6	18	1.2	3.2	2.8	1.2	3.8	5.3	3.3	2.8	3.6	2.0	10	7.8	7.2	10
	Sulphate (SO_4)	4.2	1.0	3.4	2.3	5.1	2.4	2.3	13	5.1	1.9	1.2	14	6.3	5.9	7.8	15	22
Total Metals	Aluminum (Al)	46	25	51	48	17	25	36	24	25	95	19	0	20	11	33	39	17
	Antimony (Sb)	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0
	Arsenic (As)	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Barium (Ba)	3.3	1.7	6.4	0.9	1.6	2.3	1.9	4.2	3.7	20	2.5	4.2	10	2.8	6.3	8.7	13
	Beryllium (Be)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bismuth (Bi)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Boron (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cadmium (Cd)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calcium (Ca)	0.9	2.1	9.3	1.2	2.6	2.0	0.6	4.0	2.2	4.8	2.6	1.6	5.8	4.7	6.7	7.4	14
	Cesium (Cs)											7.0			0			
	Chromium (Cr)	2.3	0	66	0	0	40	0	0	29	0	0	18	0	0	0	0	0
	Cobalt (Co)	0	0	17	0	0	0	0	0	0	1.0	0	0	0	0	0	0	0
	Copper (Cu)	2.4	10	12	4.1	5.8	9.1	22	76	5.9	21	7.1	22	6.9	6.3	9.3	15	74
	Iron (Fe)	0	0	31	0	0	0	0	0	16	87	20	43	13	0	0	12	10
	Lead (Pb)	0	0	33	0	0	0	0	0	0	66	1.9	0	1.3	0	0	21	19
	Lithium (Li)	0	0	5.2	4.7	11	3.2	0	7.4	0	0	0	0	0	0	0	0	0
	Magnesium (Mg)	3.7	3.1	8.0	0.5	3.8	0.6	1.5	2.1	2.4	2.1	3.1	4.1	5.5	3.2	7.9	7.5	13
	Manganese (Mn)	12	17	111	18	25	34	7.4	14	40	38	23	99	6.8	15	38	21	41
	Mercury (Hg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0
	Molybdenum (Mo)	10	13	15	6.3	4.5	4.5	2.3	5.3	12	21	5.3	19	10	5.0	8.7	16	18
	Nickel (Ni)	0	0	56	3.7	3.4	36	5.2	2.4	1.4	0.8	8.1	21	0	5.0	0	4.2	0
	Phosphorus (P)											0			0			
	Potassium (K)	2.7	1.1	4.9	0.8	2.7	1.5	1.3	1.3	4.3	4.1	2.0	6.2	5.3	2.7	9.7	6.4	9.1
	Rubidium (Rb)											3.5			3.2			
	Selenium (Se)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Silicon (Si)	4.5	12	33	0.6	5.6	9.8	6.0	9.0	16	31	13	28	5.6	1.7	13	5.1	10
	Silver (Ag)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sodium (Na)	2.9	0.7	23	1.1	4.8	0.9	1.4	2.2	2.5	4.0	2.1	5.2	2.3	5.3	7.1	5.9	12
	Strontium (Sr)	0.7	1.7	13	2.5	3.4	2.0	0.9	4.5	2.0	9.0	2.2	4.8	4.5	3.0	6.9	9.0	15
	Sulfur (S)											7.3			13			
	Tellurium (Te)											0			0			
	Thallium (Tl)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Thorium (Th)											0			0			
	Tin (Sn)	0	0	96	0	0	40	0	0	0	0	0	9.1	0	0	0	0	0
	Titanium (Ti)	0	0	0	0	0	0	0	0	0	0	27	0	0	7.8	0	0	0
	Tungsten (W)											0			0			
	Uranium (U)	1.0	6.9	11	2.3	8.6	4.9	2.1	7.4	8.4	18	4.2	15	15	8.0	11	17	31
	Vanadium (V)	0	0	1.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zinc (Zn)	0	0	0	0	0	21	0	0	7.1	0	4.2	0	0	0	0.5	0	0

Table C.11: *In-situ* water quality measurements collected at Camp Lake Tributary 1 and Tributary 2 benthic invertebrate community stations, Mary River Project CREMP, August 2016.

Study Area	Station	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	pH (pH units)	Specific Conductance (µS/cm)
Unnamed Reference Creek	REF-CRK B1	11.9	10.64	98.6	7.77	101
	REF-CRK B2	11.3	10.78	98.6	7.76	101
	REF-CRK B3	11.0	10.78	97.8	7.73	101
	REF-CRK B4	10.7	10.85	97.8	7.73	101
	REF-CRK B5	10.5	10.91	98.0	7.78	101
Camp Lake Tributary 1 Upstream	CLT-1 US B1	8.8	11.48	98.7	8.01	172
	CLT-1 US B2	8.6	11.50	98.4	8.03	173
	CLT-1 US B3	7.8	11.66	98.0	7.96	173
	CLT-1 US B4	7.6	11.56	96.5	7.99	173
	CLT-1 US B5	7.3	11.83	98.1	7.93	174
Camp Lake Tributary 1 L2 Mine Exposed	CLT-1 L2 B1	19.0	10.22	110.1	8.02	357
	CLT-1 L2 B2	18.6	10.25	109.7	8.00	356
	CLT-1 L2 B3	18.2	10.38	110.2	7.97	355
	CLT-1 L2 B4	17.5	10.44	109.2	7.95	354
	CLT-1 L2 B5	16.3	10.45	106.7	7.90	352
Camp Lake Tributary 1 Downstream	CLT-1 DS B1	8.2	11.82	100.1	7.98	233
	CLT-1 DS B2	8.9	11.70	100.9	7.99	233
	CLT-1 DS B3	10.0	11.37	100.2	8.02	232
	CLT-1 DS B4	7.0	12.07	99.2	7.90	234
	CLT-1 DS B5	12.6	10.45	98.3	7.95	229
Camp Lake Tributary 2 Upstream	CLT-2 US B1	14.3	10.26	100.3	8.11	198
	CLT-2 US B2	14.4	10.17	99.4	8.14	198
	CLT-2 US B3	14.8	10.11	99.5	8.16	197
	CLT-2 US B4	14.2	10.02	97.6	8.14	201
	CLT-2 US B5	14.0	10.05	97.5	8.15	201
Camp Lake Tributary 2 Downstream	CLT-2 DS B1	11.6	10.91	100.5	8.06	200
	CLT-2 DS B2	12.2	10.73	100.00	8.09	200
	CLT-2 DS B3	12.7	10.66	100.5	8.10	200
	CLT-2 DS B4	13.3	10.56	101.8	8.11	200
	CLT-2 DS B5	13.7	10.43	100.4	8.11	200

Table C.12: *In-situ* water quality summary statistics for the Camp Lake Tributary benthic stations, Mary River Project CREMP, August 2016. Five stations were sampled at each study area.

Metric	Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Water Temperature (°C)	Unnamed Reference Creek	11.1	0.5	0.2	10.4	11.8	10.5	11.9
	CLT1-US North Branch	8.0	0.6	0.3	7.2	8.8	7.3	8.8
	CLT1-L2 Upper Main Stem	17.9	1.1	0.5	16.6	19.2	16.3	19.0
	CLT1-DS Lower Main Stem	9.3	2.1	0.9	6.7	12.0	7.0	12.6
	CLT2-US Upstream	14.3	0.3	0.1	14.0	14.7	14.0	14.8
	CLT2-DS Downstream	12.7	0.8	0.4	11.7	13.7	11.6	13.7
Dissolved Oxygen (mg/L)	Unnamed Reference Creek	10.79	0.10	0.05	10.67	10.92	10.64	10.91
	CLT1-US North Branch	11.61	0.14	0.06	11.43	11.78	11.48	11.83
	CLT1-L2 Upper Main Stem	10.35	0.11	0.05	10.22	10.48	10.22	10.45
	CLT1-DS Lower Main Stem	11.48	0.63	0.28	10.70	12.26	10.45	12.07
	CLT2-US Upstream	10.12	0.10	0.04	10.00	10.24	10.02	10.26
	CLT2-DS Downstream	10.66	0.18	0.08	10.43	10.88	10.43	10.91
Dissolved Oxygen (% Saturation)	Unnamed Reference Creek	98.2	0.4	0.2	97.7	98.7	97.8	98.6
	CLT1-US North Branch	97.9	0.9	0.4	96.9	99.0	96.5	98.7
	CLT1-L2 Upper Main Stem	109.2	1.4	0.6	107.4	111.0	106.7	110.2
	CLT1-DS Lower Main Stem	99.7	1.0	0.5	98.5	101.0	98.3	100.9
	CLT2-US Upstream	98.9	1.2	0.6	97.3	100.4	97.5	100.3
	CLT2-DS Downstream	100.6	0.7	0.3	99.8	101.5	100.0	101.8
pH (units)	Unnamed Reference Creek	7.75	0.02	0.01	7.73	7.78	7.73	7.78
	CLT1-US North Branch	7.98	0.04	0.02	7.93	8.03	7.93	8.03
	CLT1-L2 Upper Main Stem	7.97	0.05	0.02	7.91	8.03	7.90	8.02
	CLT1-DS Lower Main Stem	7.97	0.05	0.02	7.91	8.02	7.90	8.02
	CLT2-US Upstream	8.14	0.02	0.01	8.12	8.16	8.11	8.16
	CLT2-DS Downstream	8.09	0.02	0.01	8.07	8.12	8.06	8.11
Specific Conductance (µS/cm)	Unnamed Reference Creek	101.0	0.2	0.1	100.7	101.3	100.6	101.2
	CLT1-US North Branch	172.9	0.6	0.3	172.1	173.6	172.1	173.8
	CLT1-L2 Upper Main Stem	354.8	1.8	0.8	352.6	357.1	352.1	356.6
	CLT1-DS Lower Main Stem	232	2	1	230	235	229	234
	CLT2-US Upstream	199	2	1	197	201	197	201
	CLT2-DS Downstream	200	0	0	200	200	200	200

Table C.13: *In-situ* water quality statistical comparisons among Camp Lake Tributary 1 and Unnamed Reference Creek study areas, Mary River Project CREMP, August 2016. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Areas?	p-value	Statistical Test [b]	(I) Area	(J) Area	Significant Difference Between 2 Areas?	p-value	Statistical Test
Water Temperature (°C)	YES	0.0000	α	Unnamed Reference Creek	CLT1 North Branch	YES	0.0071	Tukey's HSD
				Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.0000	
				Unnamed Reference Creek	CLT1 Lower Main Stem	NO	0.1705	
				CLT1 North Branch	CLT1 Upper Main Stem	YES	0.0000	
				CLT1 North Branch	CLT1 Lower Main Stem	NO	0.3778	
				CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	0.0000	
Dissolved Oxygen (% saturation)	YES	0.0000	α	Unnamed Reference Creek	CLT1 North Branch	NO	0.9849	Tukey's HSD
				Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.0000	
				Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.0973	
				CLT1 North Branch	CLT1 Upper Main Stem	YES	0.0000	
				CLT1 North Branch	CLT1 Lower Main Stem	YES	0.0508	
				CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	0.0000	
pH (units)	YES	0.0000	α	Unnamed Reference Creek	CLT1 North Branch	YES	0.0000	Tukey's HSD
				Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.0000	
				Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.0000	
				CLT1 North Branch	CLT1 Upper Main Stem	NO	0.9192	
				CLT1 North Branch	CLT1 Lower Main Stem	NO	0.9192	
				CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	1.0000	
Specific Conductance (µS/cm)	YES	0.0000	α	Unnamed Reference Creek	CLT1 North Branch	YES	0.0000	Tukey's HSD
				Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.0000	
				Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.0000	
				CLT1 North Branch	CLT1 Upper Main Stem	YES	0.0000	
				CLT1 North Branch	CLT1 Lower Main Stem	YES	0.0000	
				CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	0.0000	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - transformed, single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transform test conducted; β - data logit transformed, single factor ANOVA test conducted;

Table C.14: Water chemistry at lotic Camp Lake Tributary (CLT) monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Spring Sampling Event							Summer Sampling Event							Fall Sampling Event						
					L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					27-Jun-2016	27-Jun-2016	27-Jun-2016	27-Jun-2016	27-Jun-2016	27-Jun-2016	25-Jun-2016	20-Jul-2016	19-Jul-2016	19-Jul-2016	19-Jul-2016	20-Jul-2016	20-Jul-2016	20-Jul-2016	20-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	39.2	54.3	224	64	66.9	70.3	69.9	82	145	365	204	209	215	183	147	209	431	293	298	296	255
	pH (lab)	pH	6.5 - 9.0	-	7.44	7.58	7.84	7.64	7.66	7.68	7.63	7.78	8.08	8.01	8.07	8.18	8.22	8.17	7.97	8.21	7.99	8.16	8.11	8.17	8.27
	Hardness (as $CaCO_3$)	mg/L	-	-	18	25	87	29	30	32	32	40	74	156	97	99	105	93	72	105	176	136	138	138	130
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	24	36	127	42	42	47	29	40	95	195	105	205	115	87	77	94	230	156	159	143	123
	Turbidity	NTU	-	-	1.94	1.55	3.76	1.68	1.71	1.63	1.95	1.12	0.37	2.6	0.57	0.55	0.54	0.3	0.34	0.26	2.88	0.97	0.93	0.95	0.29
	Alkalinity (as $CaCO_3$)	mg/L	-	-	17	24	70	22	28	31	30	40	79	131	87	84	94	82	72	104	140	119	116	116	125
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	0.11	<0.020	<0.020	<0.020	<0.020	<0.020	0.036	0.141	0.021	<0.020	<0.020	<0.020	<0.020	<0.020	0.237	0.048	0.047	0.042	0.031
	Nitrate	mg/L	13	13	0.036	<0.020	0.579	0.03	0.036	0.028	0.039	0.120	<0.020	0.520	0.037	0.096	0.107	0.048	0.079	<0.020	1.67	0.353	0.411	0.38	0.048
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.009	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0203	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	0.35	<0.15	0.16	<0.15	<0.15	<0.15	<0.15	0.44000	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.56	0.2	0.24	<0.15	<0.15
	Nitrate and Nitrite (as N)	mg/L	-	-	0.036	<0.021	0.579	0.03	0.036	0.028	0.039	0.12000	<0.021	0.52870	0.03700	0.09600	0.10700	0.04800	0.079	<0.021	1.6903	0.353	0.411	0.38	0.048
	Dissolved Organic Carbon	mg/L	-	-	<1.0	<1.0	2.7	<1.0	<1.0	1.1	<1.0	1.4	1.7	4.2	2.1	2.2	2.1	1.4	1.8	2.4	4.6	3	3	2.9	3
	Total Organic Carbon	mg/L	-	-	<1.0	<1.0	3.1	1.2	1.2	1.3	1.1	1.4	2.7	5	2.7	2.3	2.4	2	1.9	2.6	4.6	3.2	3.4	3.1	3.2
	Total Phosphorus	mg/L	0.020[α]	-	0.006	0.0035	0.0075	<0.0030	<0.0030	<0.0030	0.0046	0.0057	0.0162	0.0049	<0.0030	<0.0030	0.0046	<0.0030	0.0087	<0.0030	0.0096	0.0033	0.0059	0.0031	0.0108
	Phenols	mg/L	0.004[α]	-	0.0024	0.0021	0.0034	0.0019	0.0025	0.0021	0.0024	<0.0010	0.022	0.0074	0.0023	0.0019	<0.0010	<0.0010	0.007	0.0067	0.0076	0.0041	0.0038	0.0025	0.0067
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	<0.50	<0.50	16.8	1.37	1.65	1.44	0.61	0.91	0.88	26.10	13.00	11.60	10.80	1.81	1.91	2.13	36.7	18.4	18.9	17.2	5.11
	Sulphate (SO_4)	mg/L	218[β]	218	0.45	1.88	13.5	2.05	2.04	2.14	5.51	1.5	2.4	24.6	4.7	5.6	5.7	8.1	2.98	4.83	18.4	7.84	8.25	7.7	5.29
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0467	0.0182	0.0577	0.0242	0.023	0.0229	0.0342	0.0191	0.0091	0.0174	0.0075	0.0106	0.0152	0.0083	0.0137	0.0071	0.031	0.0098	0.011	0.0154	0.008
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00313	0.00345	0.00901	0.00388	0.00401	0.00428	0.00382	0.0068	0.0095	0.0155	0.0129	0.0121	0.0126	0.0107	0.0109	0.0128	0.0168	0.0163	0.0155	0.0157	0.0142
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	< 0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.02	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	3.58	4.68	16.8	5.75	6.02	6.42	6.26	8	15	30	22	21	22	18	14.2	20.3	34.3	28.3	27.9	28.8	25.2
	Chromium (Cr)	mg/L	0.0089	0.000856	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	0.00017	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00023	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00034	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00114	0.00091	0.0008	0.00095	0.00093	0.00093	0.00065	0.0018	0.0017	0.0009	0.0016	0.0016	0.0015	0.0010	**0.00228**	**0.00226**	0.0013	0.00194	0.00191	0.00183	0.00156
	Iron (Fe)	mg/L	0.30	0.326	0.055	<0.030	0.225	0.039	0.039	0.041	0.044	<0.030	<0.030	**0.440**	0.050	0.038	0.036	<0.030	<0.030	<0.030	**0.459**	0.12	0.112	0.094	<0.030
	Lead (Pb)	mg/L	0.001	0.001	0.000069	<0.000050	0.000103	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.0016	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00110	0.00340	0.00290	0.00260	0.00260	0.00140	<0.0010	0.0013	0.0031	0.0037	0.0036	0.0034	0.0016
	Magnesium (Mg)	mg/L	-	-	2.17	2.84	10.4	3.25	3.49	3.77	3.87	4.94	9.22	19.2	10.7	11.7	12.4	11.1	8.69	12.9	21	15.7	15.9	15.8	15.7
	Manganese (Mn)	mg/L	0.935[β]	-	0.00148	0.000486	0.0308	0.0014	0.00134	0.00128	0.00154	0.00059	0.00047	0.07920	0.00626	0.00233	0.00194	0.00044	0.000651	0.000694	0.0511	0.0108	0.00822	0.00535	0.00104
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000144	0.000135	0.00157	0.000221	0.000211	0.000208	0.000174	0.00051	0.00040	0.00161	0.00050	0.00052	0.00049	0.00031	0.000851	0.000647	0.00353	0.0012	0.00115	0.000988	0.000436
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	0.00085	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0006	0.0012	0.0008	0.0008	0.0008	<0.00050	<0.00050	0.00071	0.00146	0.00103	0.00102	0.00101	0.00066
	Potassium (K)	mg/L	-	-	0.65	0.63	2.06	0.74	0.76	0.78	0.6	1.55	1.60	3.09	1.77	1.87	1.85	1.50	2.15	2.05	3.3	2.41	2.35	2.28	1.79
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.000118	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.42	0.34	0.52	0.37	0.37	0.38	0.41	0.62	0.79	0.79	0.82	0.91	0.97	0.77	0.83	1.1	1.22	1.21	1.26	1.3	1.05
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.194	0.28	7.07	0.635	0.675	0.657	0.459	0.385	0.890	11.400	1.990	2.290	2.350	1.480	0.584	1.55	16.3	5.32	5.37	5.1	2.8
	Strontium (Sr)	mg/L	-	-	0.00208	0.00249	0.0211	0.00453	0.00496	0.005	0.00385	0.004	0.007	0.033	0.046	0.033	0.030	0.010	0.00826	0.0106	0.0415	0.0487	0.046	0.0401	0.0151
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00001	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.00115	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000128	0.000087	0.00638	0.000323	0.000303	0.000286	0.00015	0.0008	0.0009	0.0071	0.0015	0.0017	0.0017	0.0011	0.00399	0.00277	0.0172	0.0058	0.00571	0.00501	0.00236
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0033	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0112	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0082

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake Tributaries.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.15: Dissolved metals concentrations at Camp Lake Tributary water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Spring Sampling Event						
			L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
			27-Jun-2016	27-Jun-2016	27-Jun-2016	27-Jun-2016	27-Jun-2016	27-Jun-2016	25-Jun-2016
Dissolved Metals	Aluminum (Al)	mg/L	0.0062	<0.0050	0.0053	<0.0050	<0.0050	<0.0050	<0.0050
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00304	0.00350	0.00837	0.00373	0.00392	0.00398	0.00375
	Beryllium (Be)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	3.49	4.90	16.9	5.62	5.97	6.32	6.11
	Cesium (Cs)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00101	0.00087	0.00072	0.00089	0.00093	0.00088	0.00060
	Iron (Fe)	mg/L	<0.010	<0.010	0.066	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	0.0021	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	2.22	3.09	10.8	3.57	3.75	3.90	4.06
	Manganese (Mn)	mg/L	<0.00050	<0.00050	0.0267	0.00087	0.00072	0.00052	<0.00050
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000142	0.000132	0.00142	0.000182	0.000198	0.000186	0.000154
	Nickel (Ni)	mg/L	<0.00050	<0.00050	0.00081	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)	mg/L	0.669	0.692	2.11	0.768	0.794	0.789	0.622
	Rubidium (Rb)	mg/L	0.00196	0.00187	0.00263	0.00182	0.00199	0.00190	0.00130
	Selenium (Se)	mg/L	<0.000050	<0.000050	0.000060	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.368	0.336	0.443	0.346	0.354	0.365	0.360
	Silver (Ag)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)	mg/L	<0.50	<0.50	7.55	0.68	0.72	0.69	0.50
	Strontium (Sr)	mg/L	0.0020	0.0026	0.0203	0.0044	0.0049	0.0049	0.0037
	Sulfur (S)	mg/L	<0.50	0.61	4.09	0.67	0.64	0.69	1.83
	Tellurium (Te)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Thorium (Th)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Tungsten (W)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Uranium (U)	mg/L	0.000096	0.000085	0.00609	0.000301	0.000284	0.000261	0.000135
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0036
	Zirconium (Zr)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

Parameters	Summer Sampling Event						
	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
	20-Jul-2016	19-Jul-2016	19-Jul-2016	19-Jul-2016	20-Jul-2016	20-Jul-2016	20-Jul-2016
Aluminum (Al)	0.0068	0.0034	0.0041	0.0041	0.0053	0.0043	0.0031
Antimony (Sb)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	0.00699	0.00949	0.0153	0.0127	0.0119	0.0126	0.0106
Beryllium (Be)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	<0.010	<0.010	0.016	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)	7.79	14.7	30.0	21.5	20.7	21.8	18.7
Cesium (Cs)							
Chromium (Cr)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)	<0.00010	<0.00010	0.00023	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	0.00183	0.00164	0.00082	0.00162	0.00156	0.00150	0.00097
Iron (Fe)	<0.030	<0.030	0.199	0.030	<0.030	<0.030	<0.030
Lead (Pb)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)	<0.0010	<0.0010	0.0033	0.0029	0.0026	0.0024	0.0013
Magnesium (Mg)	4.94	8.97	19.8	10.6	11.4	12.3	11.1
Manganese (Mn)	0.000304	0.000359	0.0782	0.00603	0.00161	0.00109	0.000307
Mercury (Hg)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	0.000505	0.000420	0.00155	0.000496	0.000524	0.000504	0.000340
Nickel (Ni)	<0.00050	0.00057	0.00119	0.00077	0.00077	0.00083	<0.00050
Phosphorus (P)							
Potassium (K)	1.56	1.55	3.22	1.74	1.84	1.88	1.50
Rubidium (Rb)							
Selenium (Se)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)	0.59	0.80	0.76	0.83	0.90	0.95	0.75
Silver (Ag)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	0.389	0.867	11.7	1.97	2.24	2.37	1.49
Strontium (Sr)	0.00436	0.00710	0.0340	0.0458	0.0339	0.0293	0.0106
Sulfur (S)							
Tellurium (Te)							
Thallium (Tl)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Thorium (Th)							
Tin (Sn)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Tungsten (W)							
Uranium (U)	0.000725	0.000935	0.00678	0.00148	0.00168	0.00169	0.00119
Vanadium (V)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0112
Zirconium (Zr)							

Parameters	Fall Sampling Event						
	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
	20-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016
Aluminum (Al)	0.00630	0.00470	0.00430	0.00470	0.00560	<0.0030	<0.0030
Antimony (Sb)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	0.0108	0.0126	0.0167	0.016	0.0159	0.0154	0.0140
Beryllium (Be)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	<0.010	<0.010	0.02	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)	14.3	21	34.7	29	28.6	28.7	26.3
Cesium (Cs)							
Chromium (Cr)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)	<0.00010	<0.00010	0.00031	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	0.00222	0.00222	0.00112	0.00185	0.00193	0.00178	0.00168
Iron (Fe)	<0.030	<0.030	0.158	0.06	0.051	0.037	<0.030
Lead (Pb)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)	<0.0010	0.0012	0.0039	0.0035	0.0036	0.0033	0.0015
Magnesium (Mg)	8.76	12.7	21.7	15.5	16.2	16.2	15.6
Manganese (Mn)	0.000438	0.00068	0.0498	0.0103	0.00763	0.00441	0.000802
Mercury (Hg)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	0.000885	0.000679	0.00318	0.00125	0.0012	0.00102	0.000460
Nickel (Ni)	<0.00050	0.00069	0.00133	0.00093	0.00099	0.00103	0.00062
Phosphorus (P)							
Potassium (K)	2.19	2.05	3.43	2.51	2.36	2.3	1.82
Rubidium (Rb)							
Selenium (Se)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)	0.82	1.08	1.28	1.2	1.25	1.29	1.03
Silver (Ag)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	0.595	1.56	16.4	5.47	5.54	4.96	2.85
Strontium (Sr)	0.00823	0.0108	0.0393	0.0491	0.0475	0.0415	0.0151
Sulfur (S)							
Tellurium (Te)							
Thallium (Tl)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Thorium (Th)							
Tin (Sn)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Tungsten (W)							
Uranium (U)	0.00385	0.00271	0.0166	0.00583	0.0056	0.00498	0.00232
Vanadium (V)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)	<0.0030	<0.0030	<0.0030	0.0038	<0.0030	<0.0030	0.0073
Zirconium (Zr)							

Table C.16: Summary of the magnitude of difference in aqueous metal concentrations between the Camp Lake Tributaries and mean reference creek station data for spring summer, and fall sampling events, Mary River Project CREMP, 2016.

Variable	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01
Conductivity (lab)	1.7	7.9	2.4	2.5	1.5	4.7	2.7	2.4	1.4	3.4	2.4	2.0
Hardness (as $CaCO_3$)	1.6	6.4	2.2	2.4	1.6	4.5	2.9	2.7	1.5	3.0	2.4	2.3
Total Suspended Solids (TSS)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Dissolved Solids (TDS)	1.5	6.4	2.2	1.5	1.9	5.5	4.0	2.5	1.3	3.6	2.4	1.9
Turbidity	1.2	2.6	1.2	1.3	0.2	0.7	0.1	0.1	0.3	2.6	0.9	0.3
Alkalinity (as $CaCO_3$)	1.5	5.0	1.9	2.1	1.8	4.0	2.7	2.5	1.5	2.5	2.1	2.2
Total Ammonia	0.9	5.0	0.9	0.9	1.4	7.1	1.0	1.0	1.0	12	2.3	1.6
Nitrate	1.4	29	1.6	2.0	3.5	26	4.0	2.4	2.3	79	18	2.3
Nitrite	1.0	1.0	1.0	1.0	1.0	1.7	1.0	1.0	1.0	4.1	1.0	1.0
Total Kjeldahl Nitrogen (TKN)	1.0	2.3	1.0	1.0	1.0	2.9	1.0	1.0	1.0	3.7	1.3	1.0
Dissolved Organic Carbon	1.0	2.6	1.0	1.0	1.6	4.2	2.1	1.4	1.7	3.7	2.4	2.4
Total Organic Carbon	0.9	2.7	1.1	1.0	1.9	4.5	2.2	1.8	1.5	3.1	2.2	2.2
Total Phosphorus	0.5	0.8	0.3	0.5	2.0	0.9	0.7	0.6	1.0	1.6	0.7	1.8
Phenols	0.7	1.1	0.7	0.8	10	6.7	1.6	0.9	1.3	1.4	0.6	1.2
Bromide (Br)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Chloride (Cl)	0.8	25	2.2	0.9	0.8	22	10	1.6	0.8	15	7.3	2.0
Sulphate (SO_4)	2.1	24	3.7	9.9	0.9	12	2.5	3.8	0.9	4.2	1.8	1.2
Aluminum (Al)	1.0	1.8	0.7	1.1	0.1	0.2	0.1	0.1	0.2	0.5	0.2	0.1
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.4	1.0	1.0
Barium (Ba)	1.7	4.7	2.1	2.0	1.5	2.9	2.4	2.0	1.5	2.2	2.0	1.8
Beryllium (Be)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	0.3	1.3	1.3
Bismuth (Bi)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	0.1	1.3	1.3
Boron (B)	1.0	1.2	1.0	1.0	1.0	1.6	1.0	1.0	1.0	2.0	1.0	1.0
Cadmium (Cd)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Calcium (Ca)	1.6	6.4	2.3	2.4	1.6	4.2	3.0	2.5	1.4	2.8	2.3	2.1
Chromium (Cr)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cobalt (Co)	1.0	1.7	1.0	1.0	1.0	2.3	1.0	1.0	1.0	3.4	1.0	1.0
Copper (Cu)	1.9	1.5	1.8	1.2	2.2	1.1	2.0	1.3	2.3	1.3	1.9	1.6
Iron (Fe)	1.1	5.9	1.0	1.2	0.4	5.4	0.5	0.4	0.6	9.0	2.1	0.6
Lead (Pb)	0.9	1.5	0.7	0.7	0.4	0.4	0.4	0.4	0.5	1.0	0.5	0.5
Lithium (Li)	1.0	1.6	1.0	1.0	1.1	3.4	2.7	1.4	1.2	3.1	3.6	1.6
Magnesium (Mg)	1.7	7.1	2.4	2.6	1.7	4.7	2.8	2.7	1.6	3.1	2.3	2.3
Manganese (Mn)	1.0	32	1.4	1.6	0.4	63	2.8	0.3	0.8	60	9.5	1.2
Mercury (Hg)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Molybdenum (Mo)	1.8	20	2.7	2.2	2.1	7.6	2.4	1.5	2.0	9.3	2.9	1.1
Nickel (Ni)	1.0	1.7	1.0	1.0	1.1	2.4	1.5	1.0	1.1	2.6	1.8	1.2
Potassium (K)	2.5	8.2	3.0	2.4	2.6	5.2	3.1	2.5	2.5	3.9	2.8	2.1
Selenium (Se)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	0.2	1.3	1.3
Silicon (Si)	1.0	1.4	1.0	1.1	0.8	0.9	1.0	0.8	1.0	1.3	1.3	1.1
Silver (Ag)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	2.5	0.5	0.5
Sodium (Na)	0.6	19	1.8	1.3	0.6	11	2.2	1.5	0.6	8.9	2.9	1.5
Strontium (Sr)	0.9	8.7	2.0	1.6	0.8	4.7	5.1	1.5	0.8	3.3	3.6	1.2
Thallium (Tl)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	0.1	1.3	1.3
Tin (Sn)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Titanium (Ti)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	0.1	1.3	1.3
Uranium (U)	0.6	35	1.7	0.8	1.0	8.1	1.8	1.3	0.9	4.7	1.5	0.6
Vanadium (V)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	0.6	1.1	1.1
Zinc (Zn)	1.0	1.0	1.0	1.1	1.0	1.0	1.0	3.7	1.0	1.0	1.0	2.7

Denotes slight elevation (mean variable concentration 3 to 5 times higher than respective mean reference value).

Denotes moderate elevation (mean variable concentration 5 to 10 times higher than respective mean reference value).

Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference value).

Table C.17: ***In-situ*** **water quality statistical comparisons among Camp Lake Tributary 2 and Unnamed Reference Creek study areas, Mary River Project CREMP, August 2016. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).**

Metric	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Areas?	**p-value**	**Statistical Test [b]**	**(I) Area**	**(J) Area**	**Significant Difference Between 2 Areas?**	**p-value**	**Statistical Test**
Water Temperature (°C)	YES	0.0000	α	Unnamed Reference Creek	CLT2 Upstream	YES	0.0000	Tukey's HSD
				Unnamed Reference Creek	CLT2 Downstream	YES	0.0030	
				CLT2 Upstream	CLT2 Downstream	YES	0.0028	
Dissolved Oxygen (mg/L)	YES	0.0000	α	Unnamed Reference Creek	CLT2 Upstream	YES	0.0000	Tukey's HSD
				Unnamed Reference Creek	CLT2 Downstream	NO	0.2795	
				CLT2 Upstream	CLT2 Downstream	YES	0.0001	
Dissolved Oxygen (% saturation)	YES	0.0018	α	Unnamed Reference Creek	CLT2 Upstream	NO	0.6388	Tamhane's
				Unnamed Reference Creek	CLT2 Downstream	YES	0.0009	
				CLT2 Upstream	CLT2 Downstream	YES	0.0874	
pH (units)	YES	0.0000	α	Unnamed Reference Creek	CLT2 Upstream	YES	0.0000	Tukey's HSD
				Unnamed Reference Creek	CLT2 Downstream	YES	0.0000	
				CLT2 Upstream	CLT2 Downstream	YES	0.0117	
Specific Conductance (µS/cm)	YES	0.0000	α	Unnamed Reference Creek	CLT2 Upstream	YES	0.0000	Tamhane's
				Unnamed Reference Creek	CLT2 Downstream	YES	0.0000	
				CLT2 Upstream	CLT2 Downstream	NO	0.7946	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - transformed, single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data logit transformed, single factor ANOVA test conducted;

Table C.18: *In-situ* water quality profile data collected at Camp Lake water quality monitoring stations in winter[a], Mary River Project CREMP, 2016.

Station JLO-02[b,c]					Station JLO-10[b,c]					Station JLO-01[b,c]					Station JLO-07[b,c]					Station JLO-09[b,c]				
Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)
3.15	1.0	15.1	7.8	152.5	2.85	1.1	14.9	7.9	148.2	3.20	1.1	14.5	7.8	145.7	3.10	1.3	13.9	7.9	156.4	2.90	0.5	14.2	8.1	161.3
4.15	1.3	15.1	7.7	152.1	3.85	1.2	14.7	7.8	147.3	4.20	1.2	14.5	7.8	146.3	4.10	1.3	14.1	7.6	151.8	3.90	0.8	14.1	7.9	154.5
5.15	1.3	15.1	7.8	151.5	4.85	1.3	14.7	7.8	146.8	5.20	1.2	14.6	7.8	147.0	5.10	1.3	14.2	7.6	151.7	4.90	1.2	14.3	7.8	151.4
6.15	1.3	15.0	7.8	150.1	5.85	1.3	14.6	7.8	146.7	6.20	1.2	14.7	7.8	147.3	6.10	1.3	14.1	7.6	151.1	5.90	1.3	14.2	7.8	150.7
7.15	1.3	14.9	7.8	149.8	6.85	1.3	14.6	7.8	146.3	7.20	1.3	14.7	7.8	147.0	7.10	1.3	14.3	7.6	151.6	6.90	1.3	14.1	7.8	149.4
8.15	1.3	14.9	7.8	149.9	7.85	1.3	14.5	7.8	145.7	8.20	1.3	14.6	7.8	146.6	8.10	1.3	14.4	7.6	152.4	7.90	1.4	14.0	7.8	148.7
9.15	1.3	14.9	7.8	149.9	8.85	1.3	14.7	7.8	148.1	9.20	1.3	14.6	7.8	146.5	9.10	1.3	14.3	7.6	151.9	8.90	1.4	13.9	7.8	148.1
10.15	1.3	14.9	7.8	149.9	9.85	1.3	14.8	7.8	149.3	10.20	1.3	14.5	7.8	146.0	10.10	1.3	14.1	7.6	150.1	9.90	1.4	13.8	7.8	147.7
11.15	1.4	15.0	7.8	149.6	10.85	1.3	14.9	7.8	149.6	11.20	1.4	14.4	7.8	145.8	11.10	1.4	13.8	7.6	149.1	10.90	1.5	13.7	7.7	148.3
12.15	1.4	14.9	7.7	149.1						12.20	1.4	14.4	7.8	146.0	12.10	1.5	13.7	7.6	148.3	11.90	1.5	13.7	7.7	148.3
										13.20	1.4	14.2	7.8	144.8	13.10	1.5	13.4	7.6	147.1	12.90	1.5	13.6	7.7	148.4
										14.20	1.5	13.8	7.8	142.7	14.10	1.5	13.3	7.6	146.5	13.90	1.5	13.4	7.7	149.1
										15.20	1.6	13.4	7.8	141.3	15.10	1.6	13.0	7.6	145.9	14.90	1.6	13.1	7.7	148.1
										16.20	1.7	13.2	7.7	141.0	16.10	1.7	12.8	7.6	145.4	15.90	1.6	13.0	7.7	146.7
															17.10	1.8	12.3	7.6	144.8	16.90	1.7	12.6	7.7	145.8
															18.10	1.8	11.9	7.5	144.4	17.90	1.8	12.3	7.6	144.8
															19.10	1.8	11.7	7.5	144.2					
															20.10	1.8	11.4	7.5	144.2					
															21.10	1.9	11.1	7.5	144.9					
															22.10	1.9	11.0	7.4	145.5					
															23.10	1.9	10.9	7.4	146.4					
															24.10	1.9	10.5	7.4	146.4					
															25.10	2.0	10.0	7.4	146.0					
															26.10	2.1	9.4	7.4	145.9					
															27.10	2.2	8.6	7.3	147.1					
															28.10	2.3	7.8	7.3	150.8					
															29.10	2.4	7.1	7.3	152.5					
															30.10	2.5	5.9	7.2	155.4					
															31.10	2.5	5.0	7.2	159.9					
															32.10	2.6	2.6	7.1	168.9					

[a] Sampling conducted on 23-April and 25-April, 2016.

[b] Total depth at stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 were 14.15, 12, 16.8, 32.24, and 18.8 m, respectively, at the time of winter sampling.

[c] Ice thickness at stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 were 2.15, 1.85, 2.23, 1.53, and 1.91 m, respectively, at the time of winter sampling.

Table C.19: *In-situ* water quality profile data collected at Camp Lake water quality monitoring stations in summer[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JLO-02[b]	JLO-10[b]	JLO-01[b]	JLO-07[b]	JLO-09[b]	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09
1.0	8.9	8.4	8.2	9.2	8.9	106.8	106.4	105.1	104.7	104.9	7.80	7.86	7.89	7.85	7.79	131.2	129.2	129.0	227.0	275.0
2.0	8.9	8.4	8.2	8.3	8.4	106.9	106.9	106.2	104.9	105.3	7.82	7.88	7.89	7.87	7.82	131.0	129.2	129.1	275.7	275.3
3.0	8.9	8.3	8.1	8.2	8.2	107.2	106.8	106.5	105.1	105.4	7.83	7.87	7.88	7.88	7.83	131.0	129.2	129.1	275.5	275.7
4.0	8.9	8.2	8.2	7.9	7.9	107.0	106.8	106.7	104.9	105.0	7.84	7.88	7.88	7.89	7.84	131.1	129.2	129.2	274.7	274.8
5.0	8.9	8.2	8.1	7.7	7.6	107.0	106.6	106.7	105.0	104.8	7.84	7.87	7.88	7.89	7.85	130.6	129.5	129.1	274.8	274.4
6.0	8.8		8.1	7.6	7.6	107.0		106.7	104.8	104.8	7.85		7.89	7.89	7.86	130.0		129.1	274.5	274.4
7.0	8.7		8.1	7.6	7.6	106.8		106.7	104.7	104.7	7.85		7.89	7.89	7.86	129.7		129.1	274.5	274.3
8.0	8.5		8.1	7.5	7.6	106.6		106.6	104.5	104.6	7.85		7.88	7.88	7.86	129.3		129.1	274.4	274.4
9.0	8.0		8.0	7.5	7.6	105.3		106.2	104.4	104.5	7.85		7.89	7.88	7.87	129.4		129.1	274.5	274.4
10.0	7.1		7.8	7.5	7.6	105.2		106.2	104.3	104.4	7.83		7.88	7.88	7.87	129.3		129.1	274.5	274.3
11.0	6.9		7.8	7.5	7.5	104.7		106.2	104.2	104.3	7.81		7.87	7.87	7.87	129.2		129.1	274.5	274.4
12.0	6.8		7.5	7.5	7.5	104.6		105.8	104.0	104.2	7.80		7.86	7.88	7.87	129.2		129.1	274.3	274.3
13.0			7.6	7.4	7.5			106.2	103.9	104.2			7.86	7.87	7.87			129.3	274.4	274.3
14.0			7.6	7.4	7.5			99.6	103.9	104.2			7.81	7.87	7.88			129.5	274.4	274.3
15.0				7.4	7.5				103.8	104.2				7.87	7.87				274.3	274.3
16.0				7.4	7.5				103.8	104.2				7.87	7.87				274.4	274.2
17.0				7.4					103.7					7.87					274.4	
18.0				7.4					103.6					7.87					274.4	
19.0				7.3					103.5					7.87					274.3	
20.0				7.3					103.4					7.87					274.5	
21.0				7.3					103.3					7.87					274.4	
22.0				7.3					103.2					7.86					274.4	
23.0				7.3					103.2					7.86					274.4	
24.0				7.3					103.1					7.86					274.4	
25.0				7.3					103.0					7.86					274.4	
26.0				7.2					103.0					7.86					274.4	
27.0				7.2					102.9					7.85					274.5	
28.0				7.1					102.6					7.84					274.7	
29.0				7.0					102.4					7.83					274.6	
30.0				6.8					102.2					7.82					274.6	
31.0				6.7					102.1					7.81					274.6	
32.0				6.7					102.0					7.80					274.6	

[a] Sampling conducted on 24-July and 26-July, 2016.

[b] Total depth at stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 were 12.26, 5.9, 15.9, 32.45, and 15.64 m, respectively, at the time of summer sampling.

Table C.20: *In-situ* water quality profile data collected at Camp Lake water quality monitoring stations in fall[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JLO-02[b]	JLO-10[b]	JLO-01[b]	JLO-07[b]	JLO-09[b]	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09
1.0	11.3	11.0	10.8	11.8	11.3	102.6	103.3	103.1	103.9	104.0	8.09	7.95	7.95	8.03	8.01	129.4	127.6	125.3	130.0	128.7
2.0	11.1	11.0	10.8	11.5	11.1	103.1	103.1	102.9	103.4	103.7	8.00	7.97	7.95	8.01	8.00	129.1	127.3	125.2	128.5	128.1
3.0	11.0	10.9	10.8	11.1	11.1	103.2	103.3	102.9	104.0	103.7	8.00	7.98	7.96	8.01	8.00	128.3	127.0	125.0	128.5	127.8
4.0	10.9	10.8	10.7	11.0	11.0	103.2	103.1	102.7	103.6	103.7	8.00	7.98	7.96	8.01	8.00	131.1	126.6	125.2	128.4	127.3
5.0	10.7	10.8	10.6	10.7	10.9	103.2	102.9	102.6	103.5	103.7	8.00	7.98	7.96	8.00	8.00	130.3	126.4	125.0	128.4	127.0
6.0	10.6	10.7	10.5	10.6	10.9	102.9	102.9	102.7	103.5	103.5	8.00	7.99	7.96	8.00	8.00	129.7	126.6	125.1	128.4	126.7
7.0	10.5	10.5	10.5	10.6	10.8	103.1	102.8	102.6	103.3	103.3	8.00	7.99	7.96	8.00	8.00	129.5	126.9	125.3	128.3	126.6
8.0	10.4	10.4	10.4	10.4	10.7	103.0	102.9	102.5	103.4	102.9	7.99	7.99	7.96	7.99	8.00	128.5	126.9	125.5	128.1	126.8
9.0	10.3		10.3	10.4	10.4	103.0		102.5	103.2	102.8	7.98		7.95	7.99	8.00	127.6		125.3	127.8	127.0
10.0	10.2		10.3	10.3	10.3	102.7		102.3	102.9	102.7	7.98		7.94	7.99	7.99	127.3		125.2	128.2	126.4
11.0	10.1		10.1	10.2	10.0	102.8		102.4	102.8	102.9	7.97		7.93	7.99	7.98	128.6		125.7	127.3	125.6
12.0	10.0		9.8	9.9	9.8	102.8		102.4	102.1	102.9	7.96		7.91	7.97	7.96	128.0		125.2	125.3	125.1
13.0	9.6		9.4	9.0	9.5	102.5		102.6	102.4	102.3	7.94		7.88	7.92	7.93	126.6		123.8	124.1	124.4
14.0			8.8	8.7	8.9			102.4	102.6	102.5			7.84	7.89	7.90			123.2	123.7	123.2
15.0			8.4	8.5	8.3*			101.9	102.4	102.1*			7.79	7.85	7.84*			122.7	123.5	122.3*
16.0			8.1*	8.4				101.2*	102.1				7.76	7.84				122.3*	123.1	
17.0				8.1					101.1					7.80					122.5	
18.0				7.8					100.3					7.77					122.2	
19.0				7.7					99.5					7.75					121.3	
20.0				7.7					99.3					7.74					121.2	
21.0				7.6					99.0					7.72					121.2	
22.0				7.5					98.6					7.71					121.1	
23.0				7.5					98.0					7.69					121.0	
24.0				7.4					97.4					7.68					120.9	
25.0				7.4					97.1					7.67					120.8	
26.0				7.4					96.8					7.66					120.7	
27.0				7.4					96.5					7.66					120.7	
28.0				7.3					95.9					7.64					120.8	
29.0				7.3					95.2					7.63					120.8	
30.0				7.3					94.6					7.61					120.7	
31.0				7.3					94.1					7.6					120.5	
32.0				7.2					93.3					7.58					120.5	

[a] Sampling conducted on 22-August, 2016.
[b] Total depth at Stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 were 12.4, 9.3, 16.5, 32.7, and 14.9 m, respectively, at the time of fall sampling.
* The deepest *in situ* water quality reading at stations JLO-01 and JLO-09 were taken at 15.5 m and 14.5 m, respectively, at the time of fall sampling.

Table C.21: Sampling depth, water clarity measures, and surface and bottom *in-situ* water quality measures collected at Camp Lake benthic invertebrate community stations, Mary River Project CREMP, August 2016.

Replicate ID	Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (pH units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
JLO-02	11-Aug-16	10.6	8.2	clear, slight blue-green colouration	surface	11.92	11.42	105.9	7.98	133
					bottom	9.23	12.01	104.5	7.88	134
JLO-21	11-Aug-16	11.1	7.8	clear, slight blue-green colouration	surface	11.88	11.39	105.5	8.04	133
					bottom	9.28	12.03	104.8	8.03	134
JLO-32	11-Aug-16	9.9	8.1	clear, slight blue-green colouration	surface	12.26	11.51	106.7	8.05	133
					bottom	9.16	12.23	106.3	8.00	132
JLO-31	11-Aug-16	11.7	8.3	clear, slight blue-green colouration	surface	12.01	11.81	109.6	8.05	132
					bottom	8.98	12.18	105.0	7.98	131
JLO-30	11-Aug-16	10.6	7.3	clear, slight blue-green colouration	surface	11.46	11.47	105.2	8.03	131
					bottom	9.31	11.94	104.1	7.99	131

Table C.22: Water depth and *in-situ* water quality summary statistics for littoral (<12 m) lake benthic stations, Mary River Project CREMP, August 2016. Five replicate littoral stations were sampled at all but Mary Lake, where six littoral stations were sampled.

Metric	Lake	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Water Depth (m)	Reference 3	9.32	1.03	0.46	8.04	10.60	8.10	10.70
	Camp	10.78	0.67	0.30	9.95	11.61	9.90	11.70
	Sheardown NW	9.36	1.52	0.68	7.48	11.24	7.50	11.40
	Sheardown SE	10.42	2.92	1.31	6.79	14.05	6.70	13.90
	Mary	10.69	1.05	0.43	9.58	11.79	9.10	11.60
Water Temperarture (^{o}C)	Reference 3	9.92	0.37	0.17	9.46	10.38	9.50	10.40
	Camp	9.19	0.13	0.06	9.03	9.36	8.98	9.31
	Sheardown NW	10.55	0.37	0.17	10.09	11.02	9.99	10.95
	Sheardown SE	10.49	0.67	0.30	9.65	11.33	9.91	11.36
	Mary	10.17	1.25	0.51	8.86	11.48	9.23	12.63
Dissolved Oxygen (mg/L)	Reference 3	10.35	0.82	0.37	9.33	11.36	9.28	11.34
	Camp	12.08	0.12	0.05	11.93	12.23	11.94	12.23
	Sheardown NW	10.97	0.36	0.16	10.52	11.42	10.34	11.19
	Sheardown SE	9.81	0.58	0.26	9.08	10.54	9.15	10.42
	Mary	10.11	1.61	0.66	8.42	11.79	7.79	11.69
Dissolved Oxygen (% saturation)	Reference 3	91.3	6.7	3.0	83.0	99.6	82.6	99.1
	Camp	104.9	0.8	0.4	103.9	106.0	104.1	106.3
	Sheardown NW	99.2	2.5	1.1	96.1	102.3	94.9	101.3
	Sheardown SE	88.1	6.6	3.0	79.9	96.4	80.9	95.3
	Mary	88.8	15.0	6.1	73.0	104.5	63.7	102.5
pH (pH units)	Reference 3	7.64	0.23	0.10	7.36	7.93	7.28	7.86
	Camp	7.98	0.06	0.03	7.91	8.05	7.88	8.03
	Sheardown NW	7.80	0.18	0.08	7.57	8.03	7.51	7.93
	Sheardown SE	7.65	0.17	0.07	7.44	7.86	7.45	7.82
	Mary	7.56	0.31	0.13	7.24	7.89	7.19	7.94
Specific Conductance (µS/cm)	Reference 3	74.0	0.0	0.0	74.0	74.0	74.0	74.0
	Camp	132.4	1.5	0.7	130.5	134.3	131.0	134.0
	Sheardown NW	125.6	0.5	0.2	124.9	126.3	125.0	126.0
	Sheardown SE	108.8	4.0	1.8	103.9	113.7	105.0	115.0
	Mary	80.7	19.6	8.0	60.1	101.3	69.0	120.0
Secchi Depth (m)	Reference 3	8.88	0.71	0.32	8.00	9.76	8.10	10.00
	Camp	7.94	0.43	0.19	7.41	8.47	7.28	8.31
	Sheardown NW	5.03	0.16	0.07	4.82	5.23	4.78	5.24
	Sheardown SE	2.15	0.08	0.04	2.05	2.25	2.03	2.24
	Mary	3.46	0.46	0.19	2.97	3.94	2.86	3.99

Table C.23: Statistical comparison of bottom *in-situ* water quality between littoral stations of Camp Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

Habitat Variable	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Lake	n	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	Yes	0.035	α, δ, γ	Reference	5	8.88	0.71	0.32	8.10	10.00
				Camp	5	7.94	0.43	0.19	7.28	8.31
Temperature (˚C)	Yes	0.004	α, ε, γ	Reference	5	9.92	0.37	0.17	9.50	10.40
				Camp	5	9.19	0.13	0.06	8.98	9.31
Dissolved Oxygen (mg/L)	Yes	0.002	α, ε, γ	Reference	5	10.3	0.8	0.4	9.3	11.3
				Camp	5	12.1	0.1	0.1	11.9	12.2
Dissolved Oxygen (% saturation)	Yes	0.002	α, ε, γ	Reference	5	91.3	6.7	3.0	82.6	99.1
				Camp	5	104.9	0.8	0.4	104.1	106.3
pH (units)	Yes	0.014	α, ε, γ	Reference	5	7.64	0.23	0.10	7.28	7.86
				Camp	5	7.98	0.06	0.03	7.88	8.03
Specific Conductance (umho/cm)	Yes	0.000	α, ε, γ	Reference	5	74.0	0.0	0.0	74.0	74.0
				Camp	5	132.4	1.5	0.7	131.0	134.0

[a] Data analysis included: α - data untransformed; β - data logit transformed; ι - $\log_{10}$ transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table C.24: Water chemistry at Camp Lake (JLO) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event										Summer Sampling Event					
					JL0-02 surface 23-Apr-16	JL0-02 bottom 23-Apr-16	JL0-10 surface 23-Apr-16	JL0-10 bottom 23-Apr-16	JL0-01 surface 23-Apr-16	JL0-01 bottom 23-Apr-16	JL0-07 surface 25-Apr-16	JL0-07 bottom 25-Apr-16	JL0-09 surface 25-Apr-16	JL0-09 bottom 25-Apr-16	JL0-02 surface 24-Jul-16	JL0-02 bottom 24-Jul-16	JL0-10 surface 24-Jul-16	JL0-10 bottom 24-Jul-16	JL0-01 surface 24-Jul-16	JL0-01 bottom 24-Jul-16
Conventionals	Conductivity (lab)	umho/cm	-	-	162	159	160	158	156	151	158	171	163	154	134	132	131	131	131	131
	pH (lab)	pH	6.5 - 9.0	-	7.81	7.83	7.71	7.81	7.80	7.61	7.95	7.29	7.86	7.91	8.03	7.96	7.99	8.01	8.02	7.99
	Hardness (as $CaCO_3$)	mg/L	-	-	80.5	79	80	79	76	73	78	76	80	75	63	59	60	62	61	62
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	2.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	106	101	105	105	99	96	100	114	103	98	62	67	65	70	70	65
	Turbidity	NTU	-	-	0.19	0.42	0.16	0.23	0.17	0.61	0.23	0.31	0.16	0.16	0.93	0.69	0.64	0.75	0.74	0.66
	Alkalinity (as $CaCO_3$)	mg/L	-	-	76	77	74	74	75	74	73	74	77	72	65	62	57	60	61	57
Nutrients and Organics	Total Ammonia	mg/L	variable	0.855	0.023	0.025	0.026	0.022	0.064	0.027	0.041	<0.020	0.042	<0.020	0.097	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.116	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Nitrate and Nitrite (as N)	mg/L	-	-	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	0.116	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
	Dissolved Organic Carbon	mg/L	-	-	3.0	3.3	3.2	2.7	2.7	3.0	2.9	2.3	3.0	2.7	1.4	1.4	1.6	1.7	1.6	1.6
	Total Organic Carbon	mg/L	-	-	2.1	2.3	2.3	2.1	2.1	2.0	2.1	2.2	2.2	1.9	1.6	4.4	1.7	1.7	1.6	2.0
	Total Phosphorus	mg/L	0.020^{α}	-	0.0031	0.0045	0.0030	<0.0030	<0.0030	0.0048	0.0032	0.0039	<0.0030	0.0032	0.0038	0.0036	0.0046	0.0038	<0.0030	0.0127
	Phenols	mg/L	0.004^{α}	-	0.0017	0.0015	0.0022	0.0019	0.0019	0.0020	0.0034	0.0026	0.0033	0.0020	<0.0010	<0.0010	<0.0010	0.0012	0.0012	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	4.26	4.34	4.20	4.15	4.07	3.91	4.12	8.94	4.26	3.97	3.48	3.32	3.33	3.32	3.32	3.32
	Sulphate (SO_4)	mg/L	218^{β}	218	2.03	2.03	1.99	1.97	1.95	1.86	1.96	2.04	2.02	1.88	2.13	1.98	2.01	2.00	1.99	1.99
Total Metals	Aluminum (Al)	mg/L	0.100	0.1	0.0039	***0.115***	<0.0030	<0.0030	<0.0030	0.0060	<0.0030	<0.0030	<0.0030	<0.0030	0.0062	0.0078	0.0061	0.0110	0.0052	0.0146
	Antimony (Sb)	mg/L	0.020^{α}	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	0.00023	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00735	0.00804	0.00735	0.00697	0.00724	0.00680	0.00719	0.00758	0.00728	0.00684	0.00638	0.00642	0.00616	0.00609	0.00604	0.00608
	Beryllium (Be)	mg/L	0.011^{α}	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	16.4	22.3	16.5	15.7	15.7	15.0	15.9	15.7	16.0	15.2	12.7	12.6	12.2	12.3	12.2	12.1
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	0.00419	0.00077	0.00120	0.00069	0.00051	<0.00050	<0.00050	<0.00050	0.00144	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009^{α}	0.004	<0.00010	0.00025	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.004	0.00121	0.00181	0.00110	0.00106	0.00104	0.00102	0.00106	0.00095	0.00101	0.00098	0.00082	0.00080	0.00080	0.00083	0.00078	0.00085
	Iron (Fe)	mg/L	0.30	0.300	<0.030	0.249	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000523	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	0.0013	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	9.65	12.7	9.52	9.41	9.26	8.92	9.50	9.28	9.65	9.13	7.54	7.61	7.62	7.60	7.58	7.61
	Manganese (Mn)	mg/L	0.935^{β}	-	0.000380	0.0100	0.000606	0.00104	0.000626	0.00182	0.000661	0.00971	0.000721	0.00116	0.00272	0.00279	0.00285	0.00442	0.00268	0.00396
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000322	0.000477	0.000398	0.000366	0.000355	0.000308	0.000367	0.000323	0.000360	0.000353	0.000244	0.000249	0.000242	0.000229	0.000254	0.000224
	Nickel (Ni)	mg/L	0.025	0.025	0.00069	0.0114	0.00266	0.00358	0.00210	0.00190	0.00194	0.00170	0.00164	0.00272	0.00061	0.00061	0.00055	0.00061	0.00060	0.00062
	Potassium (K)	mg/L	-	-	1.27	1.32	1.26	1.22	1.21	1.15	1.26	1.18	1.26	1.19	1.02	1.04	1.02	1.02	1.02	1.02
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.42	0.58	0.42	0.41	0.41	0.42	0.41	1.87	0.42	0.42	0.36	0.36	0.35	0.36	0.35	0.35
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.65	1.86	1.63	1.59	1.57	1.52	1.61	4.37	1.65	1.55	1.29	1.33	1.31	1.31	1.30	1.30
	Strontium (Sr)	mg/L	-	-	0.0116	0.0156	0.0119	0.0114	0.0111	0.0108	0.0115	0.0139	0.0118	0.0110	0.00973	0.00928	0.00919	0.00914	0.00926	0.00900
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	0.00186	0.00011	0.00027	0.00058	0.00013	0.00020	0.00011	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000916	0.000913	0.000900	0.000856	0.000895	0.000829	0.000859	0.000584	0.000883	0.000839	0.000668	0.000639	0.000641	0.000654	0.000630	0.000641
	Vanadium (V)	mg/L	0.006^{α}	0.006	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake system.

(grey shading) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.24: Water chemistry at Camp Lake (JLO) water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event					Fall Sampling Event										
					JL0-07 surface 26-Jul-16	JL0-07 bottom 26-Jul-16	JL0-09 surface 26-Jul-16	JL0-09 bottom 26-Jul-16	J0-01 outlet 20-Jul-16	JL0-02 surface 22-Aug-16	JL0-02 bottom 22-Aug-16	JL0-10 surface 22-Aug-16	JL0-10 bottom 22-Aug-16	JL0-01 surface 22-Aug-16	JL0-01 bottom 22-Aug-16	JL0-07 surface 22-Aug-16	JL0-07 bottom 22-Aug-16	JL0-09 surface 22-Aug-16	JL0-09 bottom 22-Aug-16	J0-01 outlet 20-Aug-16
Conventionals	Conductivity (lab)	umho/cm	-	-	132	132	132	131	130	138	140	138	139	137	133	138	133	138	134	137
	pH (lab)	pH	6.5 - 9.0	-	7.98	5.81	7.97	7.97	7.99	8.10	8.11	8.11	8.10	8.12	7.96	8.13	7.86	8.12	8.01	8.01
	Hardness (as $CaCO_3$)	mg/L	-	-	64.5	64	63	64	65	64	66	67	67	66	62.5	66	63	65	67	66.5
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.9	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	75	75	76	74	70	73	78	71	74	64	64	71	71	75	73	67
	Turbidity	NTU	-	-	0.38	<0.10	0.31	0.35	0.87	0.53	0.40	0.43	0.43	0.51	0.94	0.38	0.55	0.52	0.42	0.40
	Alkalinity (as $CaCO_3$)	mg/L	-	-	66	65	64	64	61	67	63	61	60	67	63	66	64	68	65	64
Nutrients and Organics	Total Ammonia	mg/L	variable	0.855	<0.020	<0.020	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.046	0.038	<0.020	0.039	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Nitrate and Nitrite (as N)	mg/L	-	-	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
	Dissolved Organic Carbon	mg/L	-	-	1.5	1.4	1.5	1.5	1.7	1.7	1.7	1.6	1.7	1.6	1.5	1.7	1.9	1.7	1.7	1.7
	Total Organic Carbon	mg/L	-	-	1.7	1.7	1.7	1.7	1.8	2.0	2.8	1.8	1.8	1.8	1.7	2.4	1.8	2.0	2.8	2.0
	Total Phosphorus	mg/L	0.020[α]	-	0.00325	0.0040	0.0033	0.0034	<0.0030	0.0037	0.0036	0.0063	0.0054	<0.0030	0.0043	0.0037	0.0053	0.0052	0.0086	0.0039
	Phenols	mg/L	0.001[α]	-	0.0052	0.0020	0.0033	0.0038	<0.0010	0.0014	0.0016	0.0012	0.0010	0.0019	0.0015	0.0013	0.0010	0.0018	0.0103	0.0038
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	3.34	3.32	3.30	3.29	3.27	3.53	3.73	3.46	3.51	3.45	3.34	3.54	3.45	3.47	3.37	3.47
	Sulphate (SO_4)	mg/L	218[β]	218	1.98	1.93	1.96	1.94	1.96	2.25	2.30	2.21	2.21	2.16	2.02	2.21	1.97	2.18	2.07	2.19
Total Metals	Aluminum (Al)	mg/L	0.100	0.1	0.0064	0.0045	0.0037	0.0049	0.0076	0.0065	0.0059	0.0049	0.0050	0.0045	0.0039	0.0066	0.0037	0.0049	0.0050	0.00465
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00639	0.00629	0.00623	0.00627	0.00622	0.00675	0.00680	0.00640	0.00647	0.00628	0.00603	0.00661	0.00652	0.00631	0.00637	0.00663
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	13.1	13.4	12.9	13.0	13.0	13.6	13.8	13.4	13.5	13.7	12.9	13.2	13.2	13.5	12.9	13.3
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.004	0.00078	0.00075	0.00075	0.00073	0.00076	0.00108	0.00094	0.00083	0.00084	0.00084	0.00077	0.00091	0.00094	0.00083	0.00084	0.00082
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.094
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.0012	0.0014	0.0012	0.0013	0.0012	0.0013	0.0014	0.0012	0.0013	0.0014	0.0012	0.0011	0.0014	0.0012	0.0012	0.0011
	Magnesium (Mg)	mg/L	-	-	8.10	8.06	8.03	8.00	7.84	7.98	8.34	8.12	7.95	7.75	7.54	7.98	7.52	8.14	7.83	8.22
	Manganese (Mn)	mg/L	0.935[β]	-	0.002760	0.00267	0.00276	0.00275	0.00315	0.00137	0.00154	0.00132	0.00144	0.00127	0.00180	0.00129	0.00212	0.00135	0.00172	0.00277
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000238	0.000252	0.000248	0.000262	0.000248	0.000271	0.000251	0.000256	0.000267	0.000245	0.000246	0.000259	0.000236	0.000260	0.000258	0.000265
	Nickel (Ni)	mg/L	0.025	0.025	0.00055	0.00054	0.00054	0.00052	0.00060	0.00059	0.00059	0.00060	0.00061	0.00058	0.00057	0.00063	0.00056	0.00060	0.00059	0.00073
	Potassium (K)	mg/L	-	-	1.02	1.00	1.00	1.00	1.05	1.08	1.08	1.06	1.05	1.05	1.02	1.08	1.02	1.07	1.03	1.05
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.37	0.37	0.36	0.36	0.38	0.35	0.37	0.34	0.34	0.34	0.36	0.38	0.43	0.35	0.37	0.38
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.40	1.39	1.36	1.33	1.33	1.41	1.46	1.36	1.36	1.36	1.30	1.39	1.50	1.46	1.34	1.36
	Strontium (Sr)	mg/L	-	-	0.0093	0.00959	0.00945	0.00957	0.00929	0.0104	0.0108	0.0102	0.0103	0.0104	0.00967	0.0100	0.00993	0.0102	0.00979	0.0098
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000633	0.000635	0.000642	0.000623	0.000681	0.000812	0.000823	0.000767	0.000782	0.000775	0.000691	0.000788	0.000634	0.000775	0.000725	0.000782
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake system.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.25: Dissolved metal concentrations at Camp Lake water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Winter Sampling Event										Spring Sampling	Summer Sampling Event					
			JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01	JL0-07	JL0-07	JL0-09	JL0-09	J0-01	JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01
			surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	outlet	surface	bottom	surface	bottom	surface	bottom
			23-Apr-16	23-Apr-16	23-Apr-16	23-Apr-16	23-Apr-16	23-Apr-16	25-Apr-16	25-Apr-16	25-Apr-16	25-Apr-16	26-Jun-16	24-Jul-16	24-Jul-16	24-Jul-16	24-Jul-16	24-Jul-16	24-Jul-16
Dissolved Metals	Aluminum (Al)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0050	0.0037	0.0114	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00730	0.00717	0.00708	0.00719	0.00681	0.00684	0.00721	0.00748	0.00713	0.00693	0.00511	0.00635	0.00616	0.00613	0.00616	0.00611	0.00607
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	16.3	15.8	16.4	16.1	15.5	14.8	15.5	15.2	16.3	15.1	10.6	12.5	11.8	12.1	12.3	12.0	12.4
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00125	0.00106	0.00095	0.00093	0.00091	0.00089	0.00097	0.00086	0.00098	0.00093	0.00065	0.00079	0.00110	0.00077	0.00077	0.00076	0.00075
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.010	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0011	<0.0010	0.0011	0.0013	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	0.0019	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	9.66	9.53	9.54	9.38	9.20	8.84	9.57	9.35	9.51	8.94	6.83	7.64	7.18	7.36	7.49	7.62	7.58
	Manganese (Mn)	mg/L	0.00235	0.00147	0.000589	0.000807	0.000199	0.000622	0.000579	0.000706	0.000323	0.000301	0.00124	0.000997	0.00117	0.000756	0.000747	0.000711	0.000520
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000487	0.000406	0.000362	0.000390	0.000334	0.000353	0.000462	0.000328	0.000383	0.000355	0.000210	0.000247	0.000222	0.000233	0.000239	0.000226	0.000249
	Nickel (Ni)	mg/L	0.01008	0.00423	0.00171	0.00199	0.00102	0.00156	0.00201	0.00165	0.00109	0.00108	0.00054	0.00061	0.00071	0.00054	0.00054	0.00056	0.00055
	Potassium (K)	mg/L	1.28	1.23	1.25	1.23	1.20	1.17	1.26	1.18	1.25	1.16	0.910	1.02	0.99	0.98	1.00	1.03	1.02
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.42	0.40	0.41	0.41	0.40	0.40	0.40	1.86	0.41	0.43	0.333	0.35	0.32	0.34	0.34	0.35	0.33
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.90	1.67	1.65	1.68	1.57	1.52	1.63	4.37	1.63	1.53	1.15	1.32	1.25	1.26	1.29	1.31	1.31
	Strontium (Sr)	mg/L	0.0126	0.0115	0.0119	0.0115	0.0111	0.0109	0.0114	0.0137	0.0115	0.0113	0.0081	0.00946	0.00879	0.00912	0.00933	0.00918	0.00914
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	0.00100	0.00024	<0.00010	<0.00010	<0.00010	<0.00010	0.00035	0.00013	0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000902	0.000875	0.000909	0.000915	0.000867	0.000807	0.000854	0.000544	0.000915	0.000813	0.000560	0.000674	0.000612	0.000629	0.000637	0.000602	0.000646
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0010	<0.0030	0.0068	0.0032	0.0050	<0.0030	<0.0030

Table C.25: Dissolved metal concentrations at Camp Lake water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Summer Sampling Event					Fall Sampling Event										
			JL0-07-S1 surface 26/Jul/2016	JL0-07-B1 bottom 26/Jul/2016	JL0-09-S1 surface 26/Jul/2016	JL0-09-B1 bottom 26/Jul/2016	J0-01 outlet 20/Jul/2016	JL0-02-S1 surface 22/Aug/2016	JL0-02-B1 bottom 22/Aug/2016	JL0-10-S1 surface 22/Aug/2016	JL0-10-B1 bottom 22/Aug/2016	JL0-01-S1 surface 22/Aug/2016	JL0-01-B1 bottom 22/Aug/2016	JL0-07-S1 surface 22/Aug/2016	JL0-07-B1 bottom 22/Aug/2016	JL0-09-S1 surface 22/Aug/2016	JL0-09-B1 bottom 22/Aug/2016	J0-01 outlet 20/Aug/2016
Dissolved Metals	Aluminum (Al)	mg/L	0.0089	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0033	<0.0030	0.0035	<0.0030	<0.0030	0.0034	<0.0030	<0.0030
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00623	0.00611	0.00615	0.00610	0.00639	0.00636	0.00644	0.00657	0.00630	0.00627	0.00657	0.00649	0.00604	0.00647	0.00654	0.00660
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	12.8	12.6	12.5	12.7	12.9	13.1	13.3	13.2	13.7	13.4	12.6	13.4	13.0	13.3	13.6	13.4
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00076	0.00073	0.00081	0.00142	0.00073	0.00078	0.00076	0.00089	0.00078	0.00080	0.00073	0.00078	0.00067	0.00081	0.00081	0.00079
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0012	0.0013	0.0011	0.0013	0.0012	0.0011	0.0012	0.0013	0.0011	0.0013	0.0011
	Magnesium (Mg)	mg/L	7.94	7.93	7.79	7.84	7.91	7.72	7.95	8.13	7.92	7.77	7.50	7.81	7.54	7.82	8.06	8.04
	Manganese (Mn)	mg/L	0.000700	0.000226	0.000552	0.000385	0.00136	<0.000070	<0.000070	0.000226	0.000133	0.000247	0.000134	0.000296	0.000094	0.000313	<0.000070	0.00108
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000239	0.000233	0.000237	0.000222	0.000240	0.000254	0.000272	0.000269	0.000264	0.000270	0.000238	0.000275	0.000260	0.000266	0.000284	0.000276
	Nickel (Ni)	mg/L	0.00055	0.00053	0.00058	0.00057	0.00059	0.00058	0.00057	0.00058	0.00058	0.00057	0.00055	0.00058	0.00052	0.00059	0.00057	0.00061
	Potassium (K)	mg/L	1.05	1.03	1.02	1.02	1.04	1.04	1.06	1.05	1.04	1.04	1.02	1.06	1.01	1.06	1.06	1.07
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.36	0.37	0.34	0.35	0.37	0.34	0.36	0.33	0.34	0.32	0.35	0.34	0.42	0.34	0.34	0.36
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.34	1.36	1.32	1.33	1.32	1.38	1.40	1.40	1.37	1.35	1.32	1.37	1.38	1.39	1.40	1.37
	Strontium (Sr)	mg/L	0.0095	0.00940	0.00951	0.00936	0.00919	0.00980	0.0105	0.0100	0.0103	0.0102	0.00947	0.0101	0.00966	0.0101	0.0104	0.00980
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000658	0.000633	0.000644	0.000626	0.000672	0.000728	0.000824	0.000763	0.000785	0.000775	0.000691	0.000780	0.000674	0.000789	0.000801	0.000771
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.26: Magnitude of difference in aqueous metal concentrations between Camp Lake and Reference Lake 3 in 2016, and between Camp Lake 2016 and baseline (2005 - 2013) period data for winter, summer and fall sampling events, Mary River Project CREMP. No reference lake data were collected in winter 2016.

Variable	Camp Lake vs Reference Lake 3 in 2016		Camp Lake 2016 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	1.7	1.6	1.3	1.1	1.1
Hardness (as $CaCO_3$)	1.8	1.9	1.2	1.1	1.1
Total Suspended Solids (TSS)	0.9	1.0	1.0	1.0	1.0
Total Dissolved Solids (TDS)	1.5	1.8	1.3	0.9	0.9
Turbidity	2.5	1.5	1.4	1.1	1.7
Alkalinity (as $CaCO_3$)	1.9	1.9	1.1	1.1	1.1
Total Ammonia	1.4	0.6	0.6	0.4	1.0
Nitrate	1.0	1.0	0.3	0.2	0.2
Nitrite	1.0	1.0	1.9	0.2	1.0
Total Kjeldahl Nitrogen (TKN)	0.8	1.0	0.8	0.7	0.5
Dissolved Organic Carbon	0.6	0.6	1.5	0.8	0.9
Total Organic Carbon	0.7	0.7	1.1	1.0	1.1
Total Phosphorus	0.8	0.5	0.6	1.0	1.0
Phenols	0.8	0.8	2.3	1.5	2.3
Bromide (Br)	1.0	1.0	1.1	0.4	0.4
Chloride (Cl)	2.4	2.7	3.3	1.7	1.6
Sulphate (SO_4)	0.5	0.5	1.4	1.4	0.8
Aluminum (Al)	1.7	1.2	9.0	0.6	0.8
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.0	1.1	1.0	1.0
Barium (Ba)	0.9	1.0	1.3	1.2	1.1
Beryllium (Be)	1.0	1.0	1.1	1.3	2.8
Cadmium (Cd)	1.0	1.0	0.6	0.8	0.9
Calcium (Ca)	1.8	1.9	1.3	1.1	1.1
Chromium (Cr)	1.0	1.0	8.9	1.0	1.0
Cobalt (Co)	1.0	1.0	1.2	1.0	0.9
Copper (Cu)	1.0	1.1	1.1	0.3	1.0
Iron (Fe)	1.0	1.2	1.9	1.1	1.7
Lead (Pb)	1.0	1.0	1.3	0.6	1.0
Lithium (Li)	1.1	1.3	0.2	0.2	
Magnesium (Mg)	1.8	1.9	1.3	1.1	1.1
Manganese (Mn)	4.1	2.6	3.2	1.5	1.0
Mercury (Hg)	1.0	1.0	1.0	1.0	1.0
Molybdenum (Mo)	1.9	1.9	1.8	1.3	1.2
Nickel (Ni)	1.1	1.2	4.5	0.8	1.0
Potassium (K)	1.2	1.2		1.2	1.2
Selenium (Se)	1.0	1.0			
Silicon (Si)	0.8	0.9	1.2	0.8	0.9
Silver (Ag)	1.0	1.0	1.1	1.6	2.7
Sodium (Na)	1.6	1.7		1.5	1.4
Strontium (Sr)	1.2	1.2	1.7	1.3	1.3
Thallium (Tl)	1.0	1.0	1.1	1.3	3.2
Tin (Sn)	1.0	1.0	0.3	0.2	0.1
Titanium (Ti)	1.0	1.0	1.0	1.0	1.0
Uranium (U)	2.5	2.8	1.9	1.4	1.5
Vanadium (V)	1.0	1.0	1.0	1.0	1.0
Zinc (Zn)	1.0	1.0	2.4	1.3	1.3

Denotes slight elevation (mean variable concentration 3 to 5 times higher than respective mean reference or baseline period value).

Denotes moderate elevation (mean variable concentration 5 to 10 times higher than respective mean reference or baseline period value).

Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference or baseline period value).

Table C.27: *In-situ* water quality measurements collected at Sheardown Lake Tributary 1, Tributary 12, and Tributary 9 benthic invertebrate community stations, Mary River Project CREMP, August 2016.

Study Area	Station	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	pH (pH units)	Specific Conductance (µS/cm)
Unnnamed Reference Creek	REF CRK B1	11.9	10.64	98.6	7.77	101
	REF CRK B2	11.3	10.78	98.6	7.76	101
	REF CRK B3	11.0	10.78	97.8	7.73	101
	REF CRK B4	10.7	10.85	97.8	7.73	101
	REF CRK B5	10.5	10.91	98.0	7.78	101
Sheardown Lake Tributary 1 Reach 1	SDLT-1-R1 B1	13.7	10.19	98.4	7.92	246
	SDLT-1-R1 B2	13.4	10.34	99.1	7.94	251
	SDLT-1-R1 B3	12.6	10.40	98.0	7.97	257
	SDLT-1-R1 B4	12.2	10.56	98.6	7.92	262
	SDLT-1-R1 B5	11.9	10.65	98.6	7.91	261
Sheardown Lake Tributary 12 Downstream	SDLT-12-DS B1	10.7	10.10	91.0	7.74	246
	SDLT-12-DS B2	10.5	10.18	91.3	7.78	244
	SDLT-12-DS B3	7.8	10.25	85.8	7.77	244
Sheardown Lake Tributary 9 Upstream	SDLT-9-DS B1	12.2	9.58	80.3	7.81	173
	SDLT-9-DS B2	10.0	9.55	84.7	7.53	181
	SDLT-9-DS B3	9.5	10.09	88.4	7.58	179
	SDLT-9-DS B4	9.1	10.28	89.1	7.61	178
	SDLT-9-DS B5	8.8	10.74	92.4	7.68	178

Table C.28: *In-situ* water quality summary statistics for the Sheardown Lake Tributary benthic stations, Mary River Project CREMP, August 2016. Five stations were sampled at each study area except Tributary 9, where three stations were sampled.

Metric	Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Water Temperature (°C)	Unnamed Reference Creek	11.1	0.5	0.2	10.4	11.8	10.5	11.9
	Sheardown Lake Tributary 1 (SDLT1)	12.8	0.8	0.3	11.8	13.7	11.9	13.7
	Sheardown Lake Tributary 9 (SDLT9)	9.9	1.4	0.6	8.2	11.6	8.8	12.2
	Sheardown Lake Tributary 12 (SDLT12)	9.7	1.6	0.9	5.6	13.7	7.8	10.7
Dissolved Oxygen (mg/L)	Unnamed Reference Creek	10.79	0.10	0.05	10.67	10.92	10.64	10.91
	Sheardown Lake Tributary 1 (SDLT1)	10.43	0.18	0.08	10.20	10.65	10.19	10.65
	Sheardown Lake Tributary 9 (SDLT9)	10.05	0.50	0.22	9.43	10.67	9.55	10.74
	Sheardown Lake Tributary 12 (SDLT12)	10.18	0.08	0.04	9.99	10.36	10.10	10.25
Dissolved Oxygen (% Saturation)	Unnamed Reference Creek	98.2	0.4	0.2	97.7	98.7	97.8	98.6
	Sheardown Lake Tributary 1 (SDLT1)	98.5	0.4	0.2	98.0	99.0	98.0	99.1
	Sheardown Lake Tributary 9 (SDLT9)	87.0	4.6	2.1	81.2	92.7	80.3	92.4
	Sheardown Lake Tributary 12 (SDLT12)	89.4	3.1	1.8	81.7	97.0	85.8	91.3
pH (units)	Unnamed Reference Creek	7.75	0.02	0.01	7.73	7.78	7.73	7.78
	Sheardown Lake Tributary 1 (SDLT1)	7.93	0.02	0.01	7.90	7.96	7.91	7.97
	Sheardown Lake Tributary 9 (SDLT9)	7.64	0.11	0.05	7.51	7.78	7.53	7.81
	Sheardown Lake Tributary 12 (SDLT12)	7.76	0.02	0.01	7.71	7.82	7.74	7.78
Specific Conductance (µS/cm)	Unnamed Reference Creek	101	0.2	0.1	100.7	101.3	100.6	101.2
	Sheardown Lake Tributary 1 (SDLT1)	255	7	3	247	264	246	262
	Sheardown Lake Tributary 9 (SDLT9)	178	3	1	174	182	173	181
	Sheardown Lake Tributary 12 (SDLT12)	245	1	1	242	248	244	246

Table C.29: *In-situ* water quality statistical comparisons among the Sheardown Lake Tributaries and Unnamed Reference Creek study areas, Mary River Project CREMP, August 2016. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Areas?	p-value	Statistical Test [b]	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Statistical Test
Water Temperature (°C)	YES	0.0028	α	Unnamed Reference Creek	Sheardown Tributary 1	NO	0.1081	Tukey's HSD
				Unnamed Reference Creek	Sheardown Tributary 9	NO	0.3558	
				Unnamed Reference Creek	Sheardown Tributary 12	NO	0.3126	
				Sheardown Tributary 1	Sheardown Tributary 9	YES	0.0045	
				Sheardown Tributary 1	Sheardown Tributary 12	YES	0.0071	
				Sheardown Tributary 9	Sheardown Tributary 12	NO	0.9878	
Dissolved Oxygen (% saturation)	YES	0.0000	α	Unnamed Reference Creek	Sheardown Tributary 1	NO	0.6848	Tamhane's
				Unnamed Reference Creek	Sheardown Tributary 9	YES	0.0327	
				Unnamed Reference Creek	Sheardown Tributary 12	NO	0.2055	
				Sheardown Tributary 1	Sheardown Tributary 9	YES	0.0290	
				Sheardown Tributary 1	Sheardown Tributary 12	NO	0.1911	
				Sheardown Tributary 9	Sheardown Tributary 12	NO	0.9609	
pH (units)	YES	0.0000	α	Unnamed Reference Creek	Sheardown Tributary 1	YES	0.0000	Tamhane's
				Unnamed Reference Creek	Sheardown Tributary 9	NO	0.3990	
				Unnamed Reference Creek	Sheardown Tributary 12	NO	0.9947	
				Sheardown Tributary 1	Sheardown Tributary 9	YES	0.0191	
				Sheardown Tributary 1	Sheardown Tributary 12	YES	0.0009	
				Sheardown Tributary 9	Sheardown Tributary 12	NO	0.3340	
Specific Conductance (µS/cm)	YES	0.0000	α	Unnamed Reference Creek	Sheardown Tributary 1	YES	0.0000	Tamhane's
				Unnamed Reference Creek	Sheardown Tributary 9	YES	0.0000	
				Unnamed Reference Creek	Sheardown Tributary 12	YES	0.0001	
				Sheardown Tributary 1	Sheardown Tributary 9	YES	0.0000	
				Sheardown Tributary 1	Sheardown Tributary 12	NO	0.1326	
				Sheardown Tributary 9	Sheardown Tributary 12	YES	0.0000	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - transformed, single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data logit transformed, single factor ANOVA test conducted;

Table C.30: Water chemistry at Sheardown Lake Tributary 1 (SDLT1) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Spring Sampling Event		Summer Sampling Event		Fall Sampling Event	
					D1-05 27-Jun-2016	D1-00 27-Jun-2016	D1-05 19-Jul-2016	D1-00 19-Jul-2016	D1-05 19-Aug-2016	D1-00 19-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	139	168	274	308	232	308
	pH (lab)	pH	6.5 - 9.0	-	7.71	7.93	7.75	8.05	7.85	8.08
	Hardness (as $CaCO_3$)	mg/L	-	-	63	77	131	147	108	144
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	82	91	141	186	118	166
	Turbidity	NTU	-	-	0.43	1.32	0.41	0.98	0.27	0.65
	Alkalinity (as $CaCO_3$)	mg/L	-	-	52	70	85	114	83	114
Nutrients and Organics	Total Ammonia	mg/L	variable	0.855	<0.020	<0.020	<0.020	0.057	0.030	<0.020
	Nitrate	mg/L	13	13	0.162	0.114	0.959	0.722	0.733	0.946
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	0.22	<0.15	0.23	0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.4	2.6	2.0	2.5	2.7	3.1
	Total Organic Carbon	mg/L	-	-	3.3	2.8	2.4	2.8	2.8	3.2
	Total Phosphorus	mg/L	0.020$^{\alpha}$	-	0.0036	0.0062	0.0048	0.0039	0.0110	0.0032
	Phenols	mg/L	0.004$^{\alpha}$	-	0.0023	0.0034	0.0010	0.0064	0.0110	0.0042
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.48	3.79	6.67	9.42	6.41	9.47
	Sulphate (SO_4)	mg/L	218$^{\beta}$	218	11.1	8.95	43.6	36.8	22.6	26.8
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0111	0.0323	0.0058	0.0115	0.0082	0.0138
	Antimony (Sb)	mg/L	0.020$^{\alpha}$	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00686	0.00912	0.0136	0.0184	0.0115	0.0170
	Beryllium (Be)	mg/L	0.011$^{\alpha}$	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.011	0.012	0.012	0.012
	Cadmium (Cd)	mg/L	0.00012	0.00008	0.000029	<0.000010	0.000041	0.000012	0.000037	0.000011
	Calcium (Ca)	mg/L	-	-	11.2	14.7	23.1	28.7	19.5	27.9
	Chromium (Cr)	mg/L	0.0089	0.00856	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009$^{\alpha}$	0.004	<0.00010	<0.00010	0.00011	0.00015	<0.00010	0.00011
	Copper (Cu)	mg/L	0.002	0.0022	***0.00277***	***0.00264***	***0.00266***	0.00197	***0.00310***	***0.00222***
	Iron (Fe)	mg/L	0.30	0.326	<0.030	0.088	<0.030	0.145	<0.030	0.098
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.0013	0.0019	0.0013	0.0018
	Magnesium (Mg)	mg/L	-	-	7.69	9.72	17.3	20.3	14.1	18.9
	Manganese (Mn)	mg/L	0.935$^{\beta}$	-	0.000348	0.00484	0.000421	0.00768	0.000436	0.00559
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.00218	0.00190	0.00220	0.00182	0.00325	0.00243
	Nickel (Ni)	mg/L	0.025	0.025	0.00114	0.00136	0.00121	0.00146	0.00114	0.00146
	Potassium (K)	mg/L	-	-	1.53	1.84	2.38	2.57	2.33	2.41
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.87	0.73	1.25	1.35	1.36	1.59
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.07	1.55	2.78	3.59	2.98	3.88
	Strontium (Sr)	mg/L	-	-	0.00757	0.0107	0.0149	0.0170	0.0130	0.0169
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00158	0.00211	0.00511	0.00384	0.00654	0.00532
	Vanadium (V)	mg/L	0.006$^{\alpha}$	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for WQG information.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data and adopted from the Camp Lake Tributaries.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.31: Dissolved metal concentrations at Sheardown Lake Tributary water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Spring Sampling Event		Summer Sampling Event		Fall Sampling Event	
			D1-05	D1-00	D1-05	D1-00	D1-05	D1-00
			27-Jun-2016	27-Jun-2016	19-Jul-2016	19-Jul-2016	19-Aug-2016	19-Aug-2016
Dissolved Metals	Aluminum (Al)	mg/L	0.0069	<0.0050	0.0036	0.0030	0.0048	0.0041
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00916	0.00683	0.0172	0.0137	0.0166	0.0114
	Beryllium (Be)	mg/L	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.011	<0.010	0.012	0.011	0.012	0.011
	Cadmium (Cd)	mg/L	<0.000010	0.000031	<0.000010	0.000041	0.000014	0.000039
	Calcium (Ca)	mg/L	14.6	11.7	27.8	23.6	26.9	19.6
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	0.00013	0.00011	0.00012	<0.00010
	Copper (Cu)	mg/L	0.00256	0.00274	0.00182	0.00263	0.00220	0.00317
	Iron (Fe)	mg/L	0.044	<0.010	0.077	<0.030	0.070	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0012	<0.0010	0.0017	0.0012	0.0017	0.0012
	Magnesium (Mg)	mg/L	9.97	8.29	18.9	17.4	18.6	14.4
	Manganese (Mn)	mg/L	0.00398	<0.00050	0.00712	0.000417	0.00525	0.000420
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.00169	0.00205	0.00179	0.00224	0.00242	0.00338
	Nickel (Ni)	mg/L	0.00126	0.00115	0.00139	0.00122	0.00151	0.00117
	Potassium (K)	mg/L	1.87	1.61	2.39	2.41	2.45	2.35
	Selenium (Se)	mg/L	0.00007	0.000058	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.698	0.917	1.32	1.27	1.59	1.31
	Silver (Ag)	mg/L	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.6	1.16	3.34	2.81	3.99	3.01
	Strontium (Sr)	mg/L	0.0104	0.0078	0.0174	0.0147	0.0168	0.0131
	Thallium (Tl)	mg/L	0.000011	0.000014	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.00198	0.00156	0.00373	0.00514	0.00515	0.00646
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.0014	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030

Table C.32: Magnitude of difference in aqueous metal concentrations between SDLT1 and reference creek stations in 2016, and at SDLT1 between 2016 and the baseline period, for spring, summer, and fall sampling events, Mary River Project CREMP.

Variable	SDLT1 Station D1-05 (Reach 4)						SDLT1 Station D1-00 (Reach 1)					
	2016 vs Reference Creek			2016 vs Baseline			2016 vs Reference Creek			2016 vs Baseline		
	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall
Conductivity (lab)	4.9	3.6	1.9	2.0	1.9	1.1	5.9	4.0	2.5	2.0	1.6	1.2
Hardness (as $CaCO_3$)	4.7	3.7	1.9	1.8	1.8	1.1	5.7	4.2	2.5	1.8	1.4	1.1
Total Suspended Solids (TSS)	1.0	0.8		1.0	1.0	1.0	1.0	0.8		1.0	1.0	1.0
Total Dissolved Solids (TDS)	4.1	3.3	1.8	1.9	1.5	0.9	4.6	4.3	2.6	1.7	1.5	1.0
Turbidity	0.3	0.1	0.2	0.6	1.2	0.8	0.9	0.3	0.6	0.3	1.5	1.9
Alkalinity (as $CaCO_3$)	3.7	2.6	1.5	1.8	1.3	1.0	5.0	3.5	2.0	1.8	1.2	1.0
Total Ammonia	0.9			0.1	0.2	0.5	0.9			0.1	1.0	0.7
Nitrate	8.1		33	1.9	10	5.1	5.7		42	1.1	7.2	9.0
Nitrite	1.0			1.0		0.7	1.0			1.0		0.8
Total Kjeldahl Nitrogen (TKN)	1.0			1.1	1.3	1.4	1.5			1.0	1.3	1.2
Dissolved Organic Carbon	2.3		2.2	0.7	0.8	1.2	2.5		2.5	0.6	0.9	1.3
Total Organic Carbon	2.9	2.0	1.9	1.0	0.9	1.2	2.4	2.3	2.2	0.6	0.9	1.2
Total Phosphorus	0.4	0.8	1.9	0.3	1.0	3.7	0.7	0.6	0.5	0.6	0.8	0.5
Phenols	0.8	0.8	2.0				1.1	5.2	0.8			
Bromide (Br)	1.0			0.4			1.0			0.4		
Chloride (Cl)	3.8	3.6	2.0	0.6	2.0	0.7	5.7	5.1	3.0		2.0	1.3
Sulphate (SO_4)	20	21	5.1	14	9.5	2.4	16	17	6.1		6.7	3.1
Aluminum (Al)	0.4	0.1	0.1	0.3	0.4	0.8	1.0	0.1	0.2	0.2	0.5	1.3
Antimony (Sb)	1.0			0.5	0.7	0.7	1.0			1.0	1.0	1.0
Arsenic (As)	1.0			1.0	1.0	1.0	1.0			1.0	1.0	1.0
Barium (Ba)	3.6	2.6	1.5	1.6	1.8	1.2	4.8	3.5	2.2	1.7	1.6	1.4
Beryllium (Be)	1.0			5.0			1.0			5.0		
Bismuth (Bi)	1.0			1.0			1.0			1.0		
Boron (B)	1.0			1.0	0.7	0.7	1.0			0.9	0.7	0.9
Cadmium (Cd)	2.9			1.0	1.2	1.0	1.0			0.7	0.7	0.8
Calcium (Ca)	4.3	3.2	1.6	1.7	1.7	1.0	5.6	4.0	2.3	1.8	1.5	1.1
Chromium (Cr)	1.0			3.0	2.4	3.8	1.0			1.0	1.7	3.3
Cobalt (Co)	1.0			0.6	0.8	0.8	1.0			0.8	1.5	1.1
Copper (Cu)	5.2	3.0	3.1	0.9	0.9	1.3	5.0	2.2	2.2	0.9	0.8	1.3
Iron (Fe)	0.8	0.4	0.5	0.5	1.2	1.2	2.3	1.8	1.7	0.5	1.4	1.9
Lead (Pb)	0.7	0.4	0.4	0.2	0.5	0.6	0.7	0.4	0.4	0.1	0.9	1.0
Lithium (Li)	1.0			2.0	1.5	1.4	1.0			2.0	1.5	1.6
Magnesium (Mg)	5.3	4.2	2.1	1.8	1.9	1.1	6.6	5.0	2.8	1.8	1.6	1.3
Manganese (Mn)	0.4	0.3	0.5	0.4	0.6	0.9	5.0	6.1	6.5	1.2	2.9	3.8
Mercury (Hg)	1.0			1.0			1.0			1.0		
Molybdenum (Mo)	28	10	8.6	2.5	0.9	1.1	24	8.6	6.4	1.5	0.9	1.3
Nickel (Ni)	2.3	2.2	1.5	0.7	1.1	1.2	2.7	2.7	2.0	0.6	1.1	1.3
Potassium (K)	6.1	4.0	2.8	1.7	1.5	1.2	7.3	4.3	2.9	1.9	1.5	1.4
Selenium (Se)	1.0						1.0					
Silicon (Si)	2.4	1.4	1.4	1.0	1.1	1.1	2.0	1.5	1.7	0.6	1.0	1.2
Silver (Ag)	1.0			0.9			1.0					
Sodium (Na)	2.9	2.8	1.6	3.6	2.9	1.4	4.2	3.6	2.1	3.1	2.9	1.8
Strontium (Sr)	3.1	2.1	1.0	2.2	1.9	1.1	4.4	2.4	1.4	2.1	1.4	1.2
Thallium (Tl)	1.0			10	7.4	7.1	1.0			10	9.1	
Tin (Sn)	1.0			1.0			1.0			1.0		
Titanium (Ti)	1.0	0.8	5.1	1.0			1.0	0.8	5.1	1.0		
Uranium (U)	8.6	5.8	1.8	2.5	2.0	0.9	12	4.4	1.5	3.4	1.5	1.2
Vanadium (V)	1.0			1.0			1.0			1.0		
Zinc (Zn)	1.0			2.2	1.2	1.4	1.0			3.0	0.7	1.1

Denotes slight elevation (mean variable concentration 3 to 5 times higher than respective mean reference or baseline period value).

Denotes moderate elevation (mean variable concentration 5 to 10 times higher than respective mean reference or baseline period value).

Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference or baseline period value).

Table C.33: *In-situ* water quality profile data collected at Sheardown Lake NW water quality monitoring stations in winter[a], Mary River Project CREMP, 2016.

Station DD-Hab 9-Stn 1[b,c]					Station DLO-01-5[b,c]					Station DLO-01-1[b,c]					Station DLO-01-4[b,c]					Station DLO-01-2[b,c]					Station DLO-01-7[b,c]				
Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (uS/cm)
2.90	1.0	101.5	7.61	146	2.90	1.3	95.9	7.83	151	3.00	1.6	98.7	8.13	152	3.15	1.7	100.2	7.92	154	3.15	1.6	98.4	7.87	151	3.20	1.4	102.0	7.7	150
3.90	1.4	101.1	7.60	150	3.90	1.5	97.2	7.79	151	4.00	1.6	99.0	7.95	151	4.15	1.7	100.5	7.83	152	4.15	1.6	98.7	7.79	151	4.20	1.5	101.4	7.6	150
4.90	1.5	100.9	7.62	150	4.90	1.5	97.9	7.74	151	5.00	1.6	99.0	7.88	151	5.15	1.6	100.6	7.77	152	5.15	1.5	99.1	7.74	151	5.20	1.5	101.2	7.6	150
5.90	1.5	100.7	7.63	149	5.90	1.5	98.2	7.70	151	6.00	1.5	99.1	7.81	151	6.15	1.6	101.1	7.74	152	6.15	1.5	99.3	7.72	151	6.20	1.5	101.0	7.6	150
6.90	1.6	100.2	7.61	149	6.90	1.5	98.3	7.66	151	7.00	1.5	99.0	7.75	151						7.15	1.6	99.3	7.69	151	7.20	1.6	100.9	7.6	150
7.90	1.6	99.9	7.62	149	7.90	1.5	98.5	7.63	151	8.00	1.5	99.2	7.69	151						8.15	1.5	99.2	7.67	151	8.20	1.6	100.5	7.6	150
8.90	1.6	99.1	7.62	149	8.90	1.5	98.3	7.61	151	9.00	1.5	99.2	7.67	151						9.15	1.6	99.2	7.66	151	9.20	1.6	100.4	7.6	150
9.90	1.6	99.1	7.6	149	9.90	1.5	97.5	7.59	151	10.00	1.5	99.1	7.64	151						10.15	1.6	99.2	7.65	151	10.20	1.6	100.0	7.6	150
					10.90	1.5	97.1	7.57	151	11.00	1.5	99.0	7.63	151						11.15	1.6	99.2	7.63	151					
					11.90	1.5	98.1	7.55	151	12.00	1.6	98.2	7.62	151						12.15	1.6	99.2	7.62	151					
					12.90	1.5	98.8	7.55	151	13.00	1.6	96.7	7.54	151						13.15	1.6	99.2	7.62	151					
					13.90	1.5	98.9	7.54	151	14.00	1.6	95.7	7.58	150						14.15	1.6	99.3	7.62	151					
					14.90	1.6	98.8	7.54	151	15.00	1.6	95.0	7.57	150						15.15	1.6	99.4	7.62	151					
					15.90	1.6	98.4	7.53	151	16.00	1.6	94.2	7.55	150						16.15	1.6	99.8	7.61	151					
					16.90	1.7	93.6	7.51	150	17.00	1.7	91.6	7.54	150						17.15	1.6	97.7	7.60	151					
					17.90	1.7	89.0	7.49	149	18.00	1.7	89.2	7.51	148						18.15	1.7	98.9	7.59	150.8					
					18.90	1.8	85.9	7.45	148	19.00	1.7	86.7	7.49	148															
					19.90	1.8	83.8	7.43	148	20.00	1.8	81.8	7.47	146.8															
					20.90	1.8	78.6	7.41	147																				
					21.90	1.9	71.7	7.34	147																				
					22.90	2.2	20.2	7.18	155																				

[a] Sampling conducted on 26-Apr and 30-Apr, 2016.
[b] Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 were 10, 23.05, 20.4, 6.4, 19.15, and 11.4, respectively, at the time of winter sampling.
[c] Ice thickness at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 were 1.98, 1.89, 2.13, 2.14, and 2.18 m, respectively, at the time of winter sampling.

Table C.34: *In-situ* water quality profile data collected at Sheardown Lake NW water quality monitoring stations in summer[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)						Dissolved Oxygen (% Saturation)						pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9[b]	DLO-01-5[b]	DLO-01-1[b]	DLO-01-4[b]	DLO-01-2[b]	DLO-01-7[b]	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7
1.0	10.0	9.0	9.5	8.8	9.1	7.9	102.2	99.8	101.2	99.3	101.6	99.2	6.77	7.00	7.57	7.64	7.73	7.65	122	128	122	137	122	137
2.0	10.0	9.0	9.4	8.7	9.1	7.5	102.2	99.8	101.4	99.0	101.8	99.1	7.14	7.10	7.60	7.67	7.74	7.65	122	128	122	137	122	137
3.0	10.0	8.9	9.4	8.4	9.1	7.8	102.1	99.6	101.6	98.9	101.8	99.0	7.22	7.18	7.66	7.68	7.75	7.67	122	128	122	137	122	137
4.0	10.0	8.8	9.4	8.4	9.1	7.8	102.1	99.6	101.5	98.7	101.9	99.1	7.31	7.26	7.69	7.69	7.78	7.68	122	128	123	137	122	137
5.0	10.0	8.7	9.3	8.3	9.1	7.7	102.1	99.4	101.5	98.9	101.7	98.4	7.36	7.31	7.73	7.70	7.80	7.70	122	128	123	137	122	137
6.0	10.0	8.6	9.3	8.2	9.1	7.4	101.6	99.3	101.7	98.4	101.6	98.1	7.40	7.38	7.75	7.70	7.84	7.70	123	129	123	137	122	137
7.0	10.0	8.6	9.3		9.0	7.3	101.8	99.1	101.4		101.5	97.9	7.43	7.43	7.77		7.84	7.69	124	129	123		122	137
8.0	10.0	8.5	9.3		9.0	7.2	101.8	99.2	101.3		101.4	97.7	7.48	7.47	7.79		7.85	7.69	124	129	123		123	137
9.0	10.0	8.4	9.1		8.8	6.9	101.7	99.1	101.0		100.6	97.0	7.50	7.51	7.79		7.87	7.67	123	129	123		123	137
10.0	10.0*	8.3	9.1		8.0		101.5*	98.8	100.9		99.4		7.53*	7.52	7.79		7.87		124*	129	123		123	
11.0		8.2	9.9		7.7			98.6	100.5		99.4			7.56	7.79		7.83			129	123		122	
12.0		8.1	7.8		7.7			98.8	100.7		98.6			7.57	7.76		7.81			128	123		122	
13.0		7.9	7.4		7.7			98.2	97.8		98.5			7.59	7.71		7.80			129	123		122	
14.0		7.6	7.3		7.7			97.7	97.1		98.4			7.57	7.64		7.80			128	122		122	
15.0		7.5	7.1		7.5			97.4	96.6		97.5			7.57	7.57		7.77			128	122		122	
16.0		7.3	7.1		7.3			97.2	96.3		97.1			7.57	7.50		7.76			129	122		122	
17.0		7.2	6.5		7.3			97.0	95.5		96.8			7.56	7.44		7.74			129	122		122	
18.0		7.1	6.7					96.6	95.3					7.56	7.40					129	122			
19.0		7.1	6.5					96.3	94.4					7.55	7.31					129	122			
20.0		7.0						96.2						7.54						129				
21.0		6.8						95.7						7.54						129				
22.0		6.5						96.1						7.54						129				

[a] Sampling conducted on 24-July to 26-July, 2016.
[b] Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 were 10.3, 24.1, 20.5, 6.0, 18.7, and 10.9 m, respectively, at the time of summer sampling.
* The deepest *in situ* water quality reading at station DD Hab9 was taken at 9.3 m at the time of fall sampling.

Table C.35: *In-situ* water quality profile data collected at Sheardown Lake NW water quality monitoring stations in fall[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)						Dissolved Oxygen (% Saturation)						pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9[b]	DLO-01-5[b]	DLO-01-1[b]	DLO-01-4[b]	DLO-01-2[b]	DLO-01-7[b]	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7
1.0	10.0	10.5	10.4	10.6	10.7	10.8	97.6	96.1	97.2	97.4	96.1	96.0	7.08	7.24	7.46	8.12	8.15	8.10	190	192	190	210	220	210
2.0	10.8	10.5	10.4	10.5	10.5	10.8	98.3	96.9	97.6	97.7	96.9	97.3	7.42	7.38	7.65	8.10	8.12	8.07	192	192	190	210	220	210
3.0	10.7	10.5	10.4	10.5	10.4	10.5	98.3	97.4	97.8	97.8	97.3	96.0	7.53	7.51	7.74	8.08	8.10	8.07	192	192	191	220	220	220
4.0	10.7	10.5	10.4	10.4	10.4	10.4	98.4	97.6	97.8	97.8	97.4	97.0	7.61	7.61	7.79	8.07	8.09	8.06	192	192	192	210	220	220
5.0	10.7	10.4	10.3	10.4	10.3	10.4	98.3	97.6	97.6	97.7	97.2	97.6	7.68	7.68	7.84	8.05	8.07	8.04	192	192	192	220	220	220
6.0	10.7	10.4	10.2	10.3	10.3	10.3	98.3	97.6	97.3	98.1	97.2	97.6	7.73	7.74	7.87	8.04	8.07	8.04	193	192	192	220	220	220
7.0	10.6	10.4	10.2		10.2	10.3	98.2	97.6	97.0		97.1	97.5	7.77	7.78	7.90		8.06	8.04	193	192	192		220	220
8.0	10.6	10.4	10.1		10.2	10.3	98.0	97.4	96.8		97.0	97.4	7.80	7.80	7.91		8.05	8.04	193	192	191		220	220
9.0	10.1	10.3	10.1		10.2	10.0	97.3	97.0	96.5		96.7	96.5	7.84	7.83	7.92		8.02	8.04	202	192	192		220	220
10.0		10.2	10.1		10.1	9.7		96.9	96.2		96.0	95.7		7.85	7.93		7.99	8.01		192	192		220	210
11.0		10.1	9.9		9.8			96.6	95.7		95.4			7.87	7.93		7.95			192	192		210	
12.0		10.1	8.6		8.9			96.4	93.1		93.2			7.89	7.87		7.90			192	186		210	
13.0		7.8	7.8		8.6			91.8	91.5		92.8			7.83	7.82		7.80			184	184		210	
14.0		6.9	7.2		8.0			89.3	90.2		91.4			7.71	7.77		7.76			183	183		210	
15.0		6.7	6.9		7.4			88.2	89.1		89.6			7.66	7.73		7.69			182	183		210	
16.0		6.5	6.6		6.8			87.4	87.9		87.4			7.61	7.69		7.61			182	182		210	
17.0		6.5	6.5		6.6			86.7	87.2		86.8			7.59	7.65		7.54			182	182		210	
18.0		6.4	6.5					86.3	87.4					7.55	7.62					182	182			
19.0		6.4	6.4					85.9	86.0					7.53	7.60					182	182			
20.0		6.3						85.2						7.51						183				
21.0		6.3						84.7						7.49						183				
22.0		6.2						84.1						7.47						183				

[a] Sampling conducted on 21-August and 22-August, 2016.

[b] Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 were 9.7, 24.4, 20.8, 6.1, 18.6, and 12.3 m, respectively, at the time of fall sampling.

Table C.36: Sampling depth, water clarity measures, and surface and bottom *in-situ* water quality measures collected at Sheardown Lake NW benthic invertebrate community stations, Mary River Project CREMP, August 2016.

Replicate ID	Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (pH units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
DD HAB9 STN2	13-Aug-16	10.3	4.8	-	surface	11.88	10.71	99.2	8.09	129
					bottom	9.99	10.34	94.9	7.72	126
DLO-01-08	13-Aug-16	11.4	5.2	clear, slight blue-green colouration	surface	12.49	10.94	102.7	8.07	128
					bottom	10.40	11.19	100.1	7.91	125
DLO-01-09	13-Aug-16	7.5	5.1	clear, slight blue-green colouration	surface	12.76	10.75	101.4	8.05	130
					bottom	10.76	11.00	99.1	7.93	125
DLO-01-03	13-Aug-16	8.6	5.0	clear, slight blue-green colouration	surface	12.35	10.92	102.2	7.96	128
					bottom	10.95	11.18	101.3	7.93	126
DLO-01-10	13-Aug-16	9.0	5.1	clear, slight blue-green colouration	surface	12.28	10.79	100.7	7.74	128
					bottom	10.67	11.16	100.5	7.51	126

Table C.37: Statistical comparison of bottom *in-situ* water quality between Sheardown Lake NW and Reference Lake 3 littoral stations, Mary River Project CREMP, August 2016.

Habitat Variable	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Lake	n	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	Yes	<0.001	α, δ, γ	Reference	5	8.88	0.71	0.32	8.10	10.00
				Sheardown NW	5	5.03	0.16	0.07	4.78	5.24
Temperature (˚C)	Yes	0.032	α, δ, γ	Reference	5	9.92	0.37	0.17	9.50	10.40
				Sheardown NW	5	10.55	0.37	0.17	9.99	10.95
Dissolved Oxygen (mg/L)	No	0.156	α, δ, γ	Reference	5	10.3	0.8	0.4	9.3	11.3
				Sheardown NW	5	11.0	0.4	0.2	10.3	11.2
Dissolved Oxygen (% saturation)	Yes	0.040	α, δ, γ	Reference	5	91.3	6.7	3.0	82.6	99.1
				Sheardown NW	5	99.2	2.5	1.1	94.9	101.3
pH (units)	No	0.270	α, δ, γ	Reference	5	7.64	0.23	0.10	7.28	7.86
				Sheardown NW	5	7.80	0.18	0.08	7.51	7.93
Specific Conductance (umho/cm)	Yes	<0.001	γ	Reference	5	74.0	0.0	0.0	74.0	74.0
				Sheardown NW	5	125.6	0.5	0.2	125.0	126.0

[a] Data analysis included: α - data untransformed; β - data logit transformed; ι - $\log_{10}$ transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table C.38: Water chemistry at Sheardown Lake NW (DLO-01) water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event											
					DD-HAB9-STN1-S	DD-HAB9-STN1-B	DL0-01-5(S)	DL0-01-5(B)	DL0-01-1	DL0-01-1(B)	DL0-01-4(S)	DL0-01-4(B)	DL0-01-2(S)	DL0-01-2(B)	DL0-01-7-S	DL0-01-7-B
					surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom
					30-Apr-2016	30-Apr-2016	26-Apr-2016	26-Apr-2016	26-Apr-2016	26-Apr-2016	26-Apr-2016	26-Apr-2016	26-Apr-2016	26-Apr-2016	30-Apr-2016	30-Apr-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	153	152	150	147	151	148	157	151	154	158	154	153
	pH (lab)	pH	6.5 - 9.0	-	8.03	8.04	7.68	7.64	7.76	7.67	7.73	7.81	7.74	7.77	8.02	8.00
	Hardness (as $CaCO_3$)	mg/L	-	-	74	73	70	68	72	71	74	72	73	72	73	74
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	77	77	76	53	88	87	91	87	90	91	81	74
	Turbidity	NTU	-	-	0.13	0.49	0.38	0.33	0.26	0.24	0.17	0.31	0.22	0.58	0.47	0.17
	Alkalinity (as $CaCO_3$)	mg/L	-	-	76	76	68	65	70	68	72	69	70	70	69	77
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	0.029	0.021	0.020	<0.020	0.043	<0.020	0.035	0.023	0.038	0.022	<0.020	<0.020
	Nitrate	mg/L	13	13	0.032	0.033	0.033	0.103	0.0335	0.051	0.030	0.033	0.032	0.030	0.033	0.033
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	0.20	0.16	0.175	0.16	0.16	0.16	0.18	0.17	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	3.7	3.4	2.9	2.5	2.7	3.2	3.0	2.7	2.8	3.4	3.6	3.6
	Total Organic Carbon	mg/L	-	-	2.0	2.1	2.2	1.9	2.1	2.0	2.1	2.0	2.1	2.3	2.0	2.0
	Total Phosphorus	mg/L	0.020[α]	-	<0.0030	<0.0030	0.0035	0.0031	0.0031	<0.0030	0.0033	0.0032	<0.0030	<0.0030	<0.0030	<0.0030
	Phenols	mg/L	0.004[α]	-	0.0013	0.0014	0.0021	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	3.52	3.50	3.59	3.50	3.51	3.46	3.88	3.52	3.54	3.51	3.54	3.49
	Sulphate (SO_4)	mg/L	218[β]	218	3.99	3.96	3.98	3.83	3.96	3.89	4.24	3.97	3.98	3.95	4.01	3.97
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	<0.0030	<0.0030	0.0052	<0.0030	0.00745	<0.0030	0.0033	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00716	0.00681	0.00650	0.00661	0.00657	0.00641	0.00658	0.00658	0.00659	0.00641	0.00695	0.00709
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	14.9	14.1	14.5	14.0	14.5	14.4	14.9	14.6	14.6	14.6	14.5	14.5
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	0.00106	<0.00050	0.00068	<0.00050	0.00108	0.00065	0.00127	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00098	0.00086	0.00096	0.00081	0.00095	0.00089	0.00096	0.00089	0.00091	0.00090	0.00094	0.00103
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0011	0.0010	0.0010	0.0011	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	9.17	9.14	8.74	8.69	8.86	8.87	8.92	8.92	8.85	9.00	9.18	9.27
	Manganese (Mn)	mg/L	0.935[β]	-	0.000821	0.00107	0.00175	0.0117	0.00175	0.00178	0.00128	0.00131	0.00141	0.00136	0.000890	0.00111
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000904	0.000898	0.000996	0.000867	0.000945	0.000915	0.000984	0.000932	0.000950	0.000945	0.000920	0.000888
	Nickel (Ni)	mg/L	0.025	0.025	0.00070	0.00068	0.00340	0.00137	0.00189	0.00137	0.00258	0.00201	0.00231	0.00115	0.00069	0.00073
	Potassium (K)	mg/L	-	-	1.21	1.20	1.20	1.18	1.21	1.21	1.22	1.24	1.21	1.24	1.24	1.21
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.65	0.64	0.64	0.98	0.65	0.71	0.65	0.63	0.65	0.63	0.62	0.62
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.55	1.54	1.52	1.51	1.54	1.51	1.54	1.52	1.52	1.53	1.55	1.56
	Strontium (Sr)	mg/L	-	-	0.00959	0.00945	0.00990	0.00948	0.0098	0.00975	0.0101	0.00979	0.00987	0.00973	0.00960	0.00946
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	0.00012	<0.00010	0.000295	<0.00010	<0.00010	<0.00010	0.00043	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00114	0.00112	0.00114	0.000983	0.001145	0.00109	0.00117	0.00113	0.00115	0.00115	0.00115	0.00110
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0132	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

(grey shading) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.38: Water chemistry at Sheardown Lake NW (DLO-01) water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event											
					DD-HAB-9-STN1-S surface 24-Jul-2016	DD-HAB-9-STN1-B bottom 24-Jul-2016	DL0-01-5-S surface 26-Jul-2016	DL0-01-5-B bottom 26-Jul-2016	DL0-01-1-S surface 24-Jul-2016	DL0-01-1-B bottom 24-Jul-2016	DL0-01-4-S surface 25-Jul-2016	DL0-01-4-B bottom 25-Jul-2016	DL0-01-2-S surface 24-Jul-2016	DL0-01-2-B bottom 24-Jul-2016	DL0-01-7-S surface 25-Jul-2016	DL0-01-7-B bottom 25-Jul-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	125	125	125	124	124	124	124	124	124	124	122	122
	pH (lab)	pH	6.5 - 9.0	-	7.97	8.00	8.00	7.84	8.00	7.80	7.90	7.98	7.92	7.90	7.88	7.96
	Hardness (as $CaCO_3$)	mg/L	-	-	59	57	59	60	57	58	57	58	58	56	57	57
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	62	57	67	67	45	52	61	62	55	50	64	58
	Turbidity	NTU	-	-	0.85	0.86	0.54	0.46	0.96	0.84	1.24	1.22	0.92	0.90	0.82	0.80
	Alkalinity (as $CaCO_3$)	mg/L	-	-	54	58	57	58	44	56	56	54	54	55	54	58
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.053	<0.020
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	1.04	0.16	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.4	1.3	1.4	1.4	1.5	1.5	1.3	1.4	1.4	1.4	1.4	1.4
	Total Organic Carbon	mg/L	-	-	1.5	1.6	1.7	1.6	1.7	2.9	1.7	1.7	1.6	1.8	1.6	1.6
	Total Phosphorus	mg/L	0.020[α]	-	0.0038	0.0069	0.0037	0.0039	0.0035	0.0033	0.0047	0.0193	0.0066	0.0046	0.0055	0.0041
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	0.0020	0.0018	0.0011	<0.0010	<0.0010	0.0042	<0.0010	<0.0010	0.0022	0.0012
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.89	2.95	2.85	2.82	2.86	2.83	2.88	2.90	2.86	2.84	2.88	2.83
	Sulphate (SO_4)	mg/L	218[β]	218	3.48	3.53	3.30	3.16	3.33	3.21	3.31	3.34	3.30	3.25	3.27	3.21
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0079	0.0067	0.0177	0.0074	0.0067	0.0076	0.0093	0.0064	0.0067	0.0121	0.0074	0.0068
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00552	0.00549	0.00594	0.00593	0.00554	0.00549	0.00545	0.00567	0.00547	0.00569	0.00569	0.00579
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	11.2	11.3	12.1	12.0	11.2	11.2	11.1	11.0	11.3	11.3	11.0	11.1
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00079	0.00088	0.00144	0.00086	0.00080	0.00072	0.00174	0.00135	0.00073	0.00081	0.00124	0.00098
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.0011	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	7.32	7.20	7.80	7.67	7.27	7.19	7.30	7.16	7.15	7.19	7.33	7.20
	Manganese (Mn)	mg/L	0.935[β]	-	0.00362	0.00372	0.00395	0.00405	0.00378	0.00389	0.00378	0.00374	0.00384	0.00532	0.00377	0.00389
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000680	0.000680	0.000733	0.000705	0.000670	0.000671	0.000679	0.000662	0.000683	0.000650	0.000667	0.000652
	Nickel (Ni)	mg/L	0.025	0.025	0.00060	0.00056	0.00066	0.00060	0.00060	0.00058	0.00061	0.00059	0.00060	0.00062	0.00062	0.00059
	Potassium (K)	mg/L	-	-	1.04	1.03	1.03	1.03	1.04	1.02	1.03	1.03	1.02	1.03	1.08	1.04
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.47	0.46	0.49	0.55	0.47	0.53	0.45	0.45	0.46	0.50	0.48	0.49
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.26	1.25	1.33	1.34	1.27	1.24	1.26	1.24	1.25	1.24	1.29	1.26
	Strontium (Sr)	mg/L	-	-	0.00774	0.00775	0.00797	0.00787	0.00751	0.00766	0.00758	0.00758	0.00757	0.00761	0.00754	0.00765
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000853	0.000833	0.000834	0.000802	0.000823	0.000818	0.000833	0.000806	0.000851	0.000836	0.000807	0.000814
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.38: Water chemistry at Sheardown Lake NW (DLO-01) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event											
					DD-HAB-9-STN-1-S surface 21-Aug-2016	DD-HAB-9-STN-1-B bottom 21-Aug-2016	DL0-01-05-S surface 21-Aug-2016	DL0-01-05-B bottom 21-Aug-2016	DL0-01-01-S surface 21-Aug-2016	DL0-01-01-B bottom 21-Aug-2016	DL0-01-4-S surface 22-Aug-2016	DL0-01-4-B bottom 22-Aug-2016	DL0-01-2-S surface 22-Aug-2016	DL0-01-2-B bottom 22-Aug-2016	DL0-01-07-S surface 22-Aug-2016	DL0-01-07-B bottom 22-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	133	135	133	126	133	127	133	132	132	126	132	133
	pH (lab)	pH	6.5 - 9.0	-	8.14	8.14	8.03	7.74	8.13	7.83	8.11	8.13	8.07	7.78	8.11	8.12
	Hardness (as $CaCO_3$)	mg/L	-	-	63	64	64	61	65	61	62	63	62	61	61	63
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	64	66	62	62	68	65	65	68	61	57	67	59
	Turbidity	NTU	-	-	0.95	0.87	0.87	0.74	0.85	0.79	0.91	0.76	0.95	0.81	0.82	0.76
	Alkalinity (as $CaCO_3$)	mg/L	-	-	60	61	62	59	59	59	59	60	60	58	58	59
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	0.033	<0.020	0.031	<0.020	<0.020	0.060	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	0.024	0.031	0.021	0.024	0.022	0.022	0.032	0.022	0.024	0.026	0.023	0.023
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	0.18	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.7	1.5	1.6	1.9	1.7	2.0	1.8	1.8	1.8	1.6	1.7	1.7
	Total Organic Carbon	mg/L	-	-	1.9	2.0	2.2	1.6	1.9	2.0	1.9	1.8	1.9	1.7	1.7	1.8
	Total Phosphorus	mg/L	0.020[α]	-	0.0044	0.0051	0.0236	0.0073	0.0072	0.0061	0.0045	<0.0030	0.0043	0.0079	0.0157	0.0043
	Phenols	mg/L	0.004[α]	-	0.0018	0.0024	0.0297	0.0020	0.0140	0.0047	0.0051	0.0019	0.0021	0.0024	0.0048	0.0034
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	3.00	3.09	3.04	2.87	3.05	2.89	3.11	3.08	3.07	2.88	3.08	3.13
	Sulphate (SO_4)	mg/L	218[β]	218	4.18	4.39	4.10	3.17	4.14	3.41	4.23	4.12	4.22	3.29	4.14	4.04
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0122	0.0129	0.0132	0.0096	0.0152	0.0102	0.0188	0.0151	0.0116	0.0113	0.0132	0.0200
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00613	0.00623	0.00623	0.00591	0.00642	0.00587	0.00609	0.00624	0.00620	0.00581	0.00645	0.00641
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	12.2	12.2	12.7	11.9	12.9	12.4	12.4	12.8	12.8	11.6	12.8	12.7
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00089	0.00105	0.00089	0.00084	0.00089	0.00082	***0.0099****	***0.0335****	***0.00388****	***0.0344****	***0.00299****	***0.0256****
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0013	0.0012	<0.0010	0.0013	0.0013
	Magnesium (Mg)	mg/L	-	-	7.86	7.94	7.62	7.41	7.62	7.59	7.81	7.74	7.70	7.41	8.09	7.78
	Manganese (Mn)	mg/L	0.935[β]	-	0.00201	0.00200	0.00190	0.00289	0.00197	0.00217	0.00194	0.00207	0.00196	0.00231	0.00207	0.00226
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000760	0.000746	0.000799	0.000715	0.000790	0.000748	0.000748	0.000764	0.000757	0.000681	0.000765	0.000772
	Nickel (Ni)	mg/L	0.025	0.025	0.00065	0.00064	0.00062	0.00060	0.00065	0.00063	0.00060	0.00061	0.00064	0.00061	0.00065	0.00065
	Potassium (K)	mg/L	-	-	1.09	1.09	1.08	1.06	1.08	1.03	1.08	1.08	1.06	1.06	1.10	1.09
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.45	0.47	0.46	0.56	0.45	0.51	0.48	0.47	0.47	0.55	0.48	0.48
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.38	1.41	1.36	1.33	1.36	1.29	1.40	1.40	1.36	1.34	1.40	1.37
	Strontium (Sr)	mg/L	-	-	0.00833	0.00813	0.00858	0.00800	0.00868	0.00835	0.00829	0.00854	0.00855	0.00773	0.00842	0.00847
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00102	0.00103	0.00101	0.000875	0.00100	0.000874	0.00102	0.00101	0.000994	0.000882	0.000970	0.000995
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.39: Dissolved metals concentrations at Sheardown Lake NW water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Winter Sampling Event												Summer Sampling Event					
			DD-HAB 9-STN1 surface 30-Apr-2016	DD-HAB 9-STN1 bottom 30-Apr-2016	DL0-01-5 surface 26-Apr-2016	DL0-01-5 bottom 26-Apr-2016	DL0-01-1 surface 26-Apr-2016	DL0-01-1 bottom 26-Apr-2016	DL0-01-4 surface 26-Apr-2016	DL0-01-4 bottom 26-Apr-2016	DL0-01-2 surface 26-Apr-2016	DL0-01-2 bottom 26-Apr-2016	DL0-01-7 surface 30-Apr-2016	DL0-01-7 bottom 30-Apr-2016	DD-HAB9-STN1 surface 24-Jul-2016	DD-HAB9-STN1 bottom 24-Jul-2016	DL0-01-5- surface 26-Jul-2016	DL0-01-5- bottom 26-Jul-2016	DL0-01-1- surface 24-Jul-2016	DL0-01-1- bottom 24-Jul-2016
Dissolved Metals	Aluminum (Al)	mg/L	0.00147	0.00111	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00179	0.00106	<0.0030	<0.0030	<0.0030	<0.0030	0.0040	<0.0030
	Antimony (Sb)	mg/L	<0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.000055	0.000061	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000059	0.000065	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00736	0.00676	0.00657	0.00654	0.00669	0.00664	0.00666	0.00661	0.00665	0.00661	0.00773	0.00722	0.00551	0.00552	0.00557	0.00579	0.00537	0.00542
	Beryllium (Be)	mg/L	<0.000010	<0.000010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000010	<0.000010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.0000050	<0.0000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.0059	0.0058	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0059	0.0058	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	14.7	14.2	13.8	13.0	14.1	14.2	15.3	14.2	14.2	14.0	14.6	14.5	11.4	11.3	11.6	11.8	11.1	11.1
	Chromium (Cr)	mg/L	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0000123	0.0000113	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0000100	0.0000135	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00088	0.00085	0.00089	0.00080	0.00084	0.00080	0.00082	0.00081	0.00086	0.00085	0.00094	0.00094	0.00162	0.00078	0.00093	0.00083	0.00074	0.00078
	Iron (Fe)	mg/L	0.0022	0.0012	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.0016	0.0017	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.0000090	<0.0000090	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000105	<0.0000090	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00097	0.00093	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00088	0.00092	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	9.00	9.03	8.61	8.57	8.90	8.58	8.81	8.79	9.07	8.90	9.00	9.15	7.30	7.04	7.37	7.30	7.14	7.22
	Manganese (Mn)	mg/L	0.000388	0.000087	0.000293	0.0112	0.00026	0.000162	0.000438	0.000371	0.000293	0.000273	0.000207	0.000117	0.000417	0.000487	0.000301	0.000117	0.000336	0.000108
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000911	0.000925	0.000981	0.000894	0.000910	0.000926	0.000974	0.000925	0.000940	0.000916	0.000933	0.000891	0.000693	0.000681	0.000659	0.000683	0.000668	0.000690
	Nickel (Ni)	mg/L	0.000682	0.000682	0.00114	0.00114	0.00093	0.00098	0.00083	0.00085	0.00096	0.00089	0.000685	0.000752	0.00061	0.00053	0.00059	0.00060	0.00060	0.00058
	Potassium (K)	mg/L	1.20	1.19	1.08	1.05	1.10	1.07	1.10	1.10	1.11	1.08	1.20	1.22	1.03	1.00	1.05	1.03	1.02	1.03
	Selenium (Se)	mg/L	<0.000040	<0.000040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000040	<0.000040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.630	0.622	0.62	0.93	0.61	0.70	0.61	0.61	0.61	0.61	0.629	0.627	0.46	0.46	0.46	0.53	0.45	0.50
	Silver (Ag)	mg/L	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.53	1.52	1.48	1.46	1.46	1.46	1.48	1.48	1.51	1.48	1.52	1.54	1.27	1.21	1.28	1.27	1.24	1.25
	Strontium (Sr)	mg/L	0.00956	0.00934	0.00936	0.00908	0.0093	0.00940	0.00977	0.00931	0.00936	0.00935	0.00949	0.00940	0.00772	0.00764	0.00790	0.00781	0.00767	0.00787
	Thallium (Tl)	mg/L	0.0000034	0.0000031	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0000032	0.0000035	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.000030	<0.000030	0.00013	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000030	<0.000030	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00050	<0.00050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.00050	<0.00050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.00114	0.00115	0.00111	0.000956	0.00111	0.00106	0.00111	0.00110	0.00111	0.00111	0.00118	0.00113	0.000860	0.000845	0.000834	0.000846	0.000841	0.000792
	Vanadium (V)	mg/L	<0.000050	0.000052	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.00126	0.00112	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00075	0.00098	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.39: Dissolved metals concentrations at Sheardown Lake NW water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Summer Sampling Event						Fall Sampling Event											
			DL0-01-4-S1	DL0-01-4-B1	DL0-01-2-S1	DL0-01-2-B1	DL0-01-7S1	DL0-01-7B1	DD-HAB9-STN1-S1	DD-HAB9-STN1-B1	DL0-01-5-S1	DL0-01-5-B1	DL0-01-1-S1	DL0-01-1-B1	DL0-01-4-S1	DL0-01-4-B1	DL0-01-2-S1	DL0-01-2-B1	DL0-01-7-S1	DL0-01-7-B1
			surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom
			25-Jul-2016	25-Jul-2016	24-Jul-2016	24-Jul-2016	25-Jul-2016	25-Jul-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	22-Aug-2016	22-Aug-2016	22-Aug-2016	22-Aug-2016	22-Aug-2016	22-Aug-2016
Dissolved Metals	Aluminum (Al)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0040	0.0032	<0.0030	0.0032	0.0040	0.0034	0.0044	0.0037	0.0034	<0.0030	0.0032	<0.0030
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00544	0.00575	0.00554	0.00567	0.00540	0.00581	0.00616	0.00619	0.00644	0.00584	0.00620	0.00595	0.00614	0.00614	0.00609	0.00586	0.00634	0.00624
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	11.2	11.3	11.4	11.1	11.2	11.0	12.6	12.6	12.5	12.1	12.6	12.3	12.4	12.3	12.3	12.1	12.2	12.4
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00165	0.00145	0.00073	0.00079	0.00131	0.00098	0.00081	0.00091	0.00084	0.00082	0.00081	0.00078	0.00959	0.0310	0.00310	0.0340	0.00322	0.0242
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0010	<0.0010	0.0011	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	7.14	7.25	7.27	6.98	7.14	7.15	7.79	7.87	7.84	7.58	8.06	7.36	7.54	7.72	7.60	7.41	7.43	7.80
	Manganese (Mn)	mg/L	0.000333	0.000299	0.000288	0.000141	0.000174	0.000143	0.000576	0.000483	0.000418	0.000152	0.000396	0.000180	0.000508	0.000454	0.000513	0.000150	0.000493	0.000409
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000656	0.000669	0.000694	0.000653	0.000670	0.000671	0.000760	0.000774	0.000728	0.000706	0.000773	0.000743	0.000747	0.000757	0.000746	0.000706	0.000748	0.000753
	Nickel (Ni)	mg/L	0.00056	0.00059	0.00058	0.00060	0.00056	0.00059	0.00062	0.00071	0.00060	0.00063	0.00061	0.00059	0.00058	0.00062	0.00062	0.00063	0.00061	0.00057
	Potassium (K)	mg/L	1.03	1.03	1.05	1.00	1.03	1.03	1.08	1.09	1.09	1.06	1.08	1.06	1.08	1.08	1.05	1.04	1.07	1.09
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.45	0.44	0.45	0.46	0.47	0.49	0.43	0.45	0.43	0.54	0.44	0.49	0.43	0.45	0.43	0.52	0.44	0.43
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.24	1.27	1.28	1.21	1.26	1.25	1.39	1.41	1.41	1.34	1.39	1.31	1.36	1.41	1.41	1.29	1.37	1.40
	Strontium (Sr)	mg/L	0.00756	0.00759	0.00774	0.00764	0.00765	0.00749	0.00843	0.00842	0.00841	0.00808	0.00836	0.00822	0.00834	0.00831	0.00835	0.00812	0.00824	0.00840
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000837	0.000837	0.000861	0.000828	0.000828	0.000807	0.00100	0.00104	0.000989	0.000861	0.000997	0.000891	0.00102	0.00102	0.00103	0.000882	0.000997	0.00101
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	<0.0030	<0.0030

Table C.40: Summary of the magnitude of difference in aqueous metal concentrations between the Sheardown Lake basins and Reference Lake 3 in 2016, and at the Sheardown Lake basins between 2016 and the baseline period for winter, summer, and fall sampling events, Mary River Project CREMP. No reference lake data were collected in winter 2016.

Variable	Sheardown Lake NW					Sheardown Lake SE				
	2016 vs Reference Lake 3		2016 vs Baseline			2016 vs Reference Lake 3		2016 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	1.6	1.6	1.1	1.1	1.1	1.2	1.4	1.0	0.9	1.0
Hardness (as $CaCO_3$)	1.6	1.8	1.1	1.0	1.0	1.2	1.6	1.0	0.9	1.0
Total Suspended Solids (TSS)	0.9	1.0	1.0	0.5	0.8	1.7	1.1	0.9	1.4	0.9
Total Dissolved Solids (TDS)	1.3	1.7	0.9	0.8	0.8	1.1	1.6	0.8	0.8	0.8
Turbidity	3.9	2.5	1.3	1.1	1.6	8.5	7.0	0.8	1.1	1.3
Alkalinity (as $CaCO_3$)	1.6	1.8	1.0	1.0	1.0	1.2	1.6	0.9	0.9	1.0
Total Ammonia	1.1	0.6	0.2	0.5	0.6	1.2	0.7	0.2	0.9	0.9
Nitrate	1.0	1.2	0.4	0.2	0.2	1.2	1.0	0.3	0.2	0.2
Nitrite	1.0	1.0	1.3	0.1	1.1	1.0	1.0	1.4	0.4	1.1
Total Kjeldahl Nitrogen (TKN)	1.2	1.0	0.7	1.4	1.0	0.8	1.0	0.7	1.1	0.7
Dissolved Organic Carbon	0.5	0.6	1.7	0.8	1.0	0.4	0.6	1.9	0.7	1.0
Total Organic Carbon	0.7	0.7	1.1	0.9	1.0	0.5	0.6	1.1	0.9	1.0
Total Phosphorus	1.1	0.8	0.8	0.9	1.5	1.7	1.0	1.0	1.3	1.8
Phenols	0.6	2.0	1.2	1.5	6.2	1.6	3.3	1.3	4.3	10
Bromide (Br)	1.0	1.0	0.6	0.4	0.4	1.0	1.0	0.7	0.4	0.4
Chloride (Cl)	2.1	2.4	1.1	1.2	1.1	1.3	1.8	1.0	0.7	0.7
Sulphate (SO_4)	0.8	1.0	1.2	1.2	1.3	0.4	0.6	1.0	0.8	1.1
Aluminum (Al)	2.0	3.2	1.2	0.6	0.7	14	13	0.6	0.8	0.8
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Barium (Ba)	0.8	0.9	1.1	1.1	1.2	0.8	1.0	1.1	0.9	1.1
Beryllium (Be)	1.0	1.0	2.0	1.4	1.5	1.0	0.2	1.5	1.2	0.3
Cadmium (Cd)	1.0	1.0	0.8	0.9	0.9	1.0	1.0	0.8	0.8	0.8
Calcium (Ca)	1.6	1.8	1.0	1.0	1.0	1.2	1.6	1.0	0.9	1.0
Chromium (Cr)	1.0	1.0				1.0	1.0			
Cobalt (Co)	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	0.9	0.9
Copper (Cu)	1.3	1.1	0.9	1.0	0.7	0.9	1.3	0.8	0.6	1.1
Iron (Fe)	1.0	1.0	1.2	1.1	0.8	2.2	2.1	0.6	0.6	0.8
Lead (Pb)	1.0	1.0	0.9	0.9	0.1	1.8	2.0	0.5	0.8	1.2
Lithium (Li)	1.0	1.1	0.4	0.3	0.0	1.0	1.0	0.3	0.2	0.3
Magnesium (Mg)	1.7	1.8	1.0	1.0	1.1	1.2	1.5	1.0	1.0	1.0
Manganese (Mn)	5.3	3.4	3.4	2.2	1.0	5.8	6.9	0.3	0.8	1.3
Mercury (Hg)	1.0	1.0	1.0	0.9	0.3	1.0	1.0	1.0	1.0	1.0
Molybdenum (Mo)	5.4	5.5	1.1	1.0	1.1	2.6	3.6	1.1	1.0	1.1
Nickel (Ni)	1.2	1.3	2.0	0.9	0.9	1.0	1.4	0.9	0.8	1.1
Potassium (K)	1.2	1.2	1.2	1.3	1.3	0.8	1.0	1.1	1.2	1.2
Selenium (Se)	1.0	1.0				1.0	0.1			0.6
Silicon (Si)	1.1	1.2	0.8	0.8	0.8	1.1	1.6	0.7	0.7	0.9
Silver (Ag)	1.0	1.0	2.5	1.0	1.3	1.0	5.0	1.6	1.4	
Sodium (Na)	1.5	1.6	1.1	1.1	1.2	1.1	1.3	1.1	1.4	1.2
Strontium (Sr)	1.0	1.0	1.0	1.0	1.1	0.7	1.0	0.8	0.7	0.9
Thallium (Tl)	1.0	1.0	2.3	1.6	0.4	1.0	0.1	1.6	1.2	0.1
Tin (Sn)	1.0	1.0	0.2	0.2	0.2	1.0	1.0	0.1	0.1	0.1
Titanium (Ti)	1.0	1.0	1.0	1.0	1.0	1.0	0.3	1.0	0.9	0.2
Uranium (U)	3.3	3.6	1.2	1.1	1.2	2.1	2.9	1.0	1.0	1.1
Vanadium (V)	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0	0.5
Zinc (Zn)	1.0	1.0	1.5	1.5	1.2	1.0	1.0	1.0	1.8	1.9

Denotes slight elevation (mean variable concentration 3 to 5 times higher than respective mean reference or baseline period value).

Denotes moderate elevation (mean variable concentration 5 to 10 times higher than respective mean reference or baseline period value).

Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference or baseline period value).

Table C.41: *In-situ* water quality profile data collected at Sheardown Lake SE water quality monitoring stations in winter[a], Mary River Project CREMP, 2016.

Station DLO-02-6[b,c]					Station DLO-02-7[b,c]					Station DLO-02-4[b,c]					Station DLO-02-8[b,c]					Station DLO-02-3[b,c]				
Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)
2.80	0.9	90.1	7.48	166	2.90	1.0	99.4	7.32	153	3.40	1.2	98.6	7.34	148	2.80	1.1	99.2	7.46	180	2.90	1.1	102.0	7.37	149
3.80	0.9	90.4	7.42	164	3.50	1.1	99.7	7.32	151	4.40	1.3	99.3	7.34	148	3.80	1.2	100.1	7.38	149	3.90	1.2	101.9	7.35	149
4.80	1.0	98.7	7.39	166						5.40	1.3	100.2	7.34	148	4.80	1.2	100.5	7.34	148	4.90	1.2	101.8	7.35	149
5.80	1.0	86.5	7.37	166						6.40	1.3	100.6	7.34	149	5.80	1.2	100.7	7.33	149	5.90	1.3	101.4	7.35	148
6.80	1.1	84.0	7.35	167						7.40	1.3	101.0	7.34	149	6.80	1.2	101.0	7.32	149	6.90	1.3	101.0	7.34	149
										8.40	1.3	101.6	7.34	149	7.80	1.2	101.9	7.32	149	7.90	1.3	101.0	7.34	149
															8.80	1.2	102.0	7.32	149	8.90	1.3	101.3	7.33	149
															9.80	1.2	101.7	7.31	149	9.90	1.3	100.5	7.33	148
															10.80	1.2	100.9	7.31	149	10.90	1.4	92.6	7.33	148
															11.80	1.4	96.5	7.29	147	11.90	1.5	75.4	7.24	148
																				12.90	1.6	46.7	7.13	149
																				13.90	1.9	25.2	6.94	163

[a] Sampling conducted 29 - 30-April 2016.
[b] Total depth at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 were 6.90, 3.90, 9.10, 13.10, and 14.70 m, respectively, at the time of winter sampling.
[c] Ice thickness at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 were 1.80, 1.97, 2.40, 1.83, and 1.93 m, respectively, at the time of winter sampling

Table C.42: *In-situ* water quality profile data collected at Sheardown Lake SE water quality monitoring stations in summer[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	DLO-02-6[b]	DLO-02-7[b]	DLO-02-4[b]	DLO-02-8[b]	DLO-02-3[b]	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3
1.0	9.9	10.3	9.7	9.9	9.8	98.6	99.1	100.2	98.4	98.8	7.78	7.88	7.57	7.79	7.71	91.0	90.0	89.0	90.0	90.0
2.0	9.8	10.0	9.6	9.8	9.7	98.3	98.5	99.0	98.3	98.3	7.76	7.83	7.64	7.78	7.68	91.0	90.0	89.0	90.0	90.0
3.0	9.7	9.8	9.6	9.7	9.7	98.3	98.2	98.3	98.0	98.1	7.77	7.82	7.67	7.80	7.70	92.0	90.0	89.0	90.0	90.0
4.0	9.7	9.5	9.6	9.5	9.6	98.5	98.5	98.1	97.6	97.8	7.79	7.84	7.68	7.81	7.72	92.0	91.0	90.0	90.0	90.0
5.0	9.6		9.5	9.4	9.5	98.0		97.6	97.3	97.2	7.83		7.69	7.81	7.74	92.0		90.0	90.0	90.0
6.0	9.5		9.4	9.2	9.4	97.4		97.1	97.6	96.6	7.81		7.71	7.81	7.73	92.0		90.0	90.0	90.0
7.0	9.5*		9.2	9.1	9.2	97.2*		96.6	96.6	96.6	7.81*		7.71	7.79	7.74	92.0*		91.0	91.0	90.0
8.0			8.8	9.0	9.1			96.0	96.6	96.7			7.72	7.80	7.72			92.0	91.0	90.0
9.0			8.7*	9.0	9.0			96.3*	96.5	96.7			7.70*	7.79	7.71			92.0*	91.0	91.0
10.0				8.8	8.9				96.3	96.5				7.79	7.73				91.0	91.0
11.0				8.7	8.9				96.4	96.6				7.79	7.73				91.0	91.0
12.0				8.6	8.8				96.4	96.5				7.80	7.74				91.0	91.0
13.0				8.6*	8.7				96.4*	96.3				7.79*	7.74				91.0*	91.0
13.9					8.7					96.3					7.75					91.0

[a] Sampling conducted on 26-July, 2016.

[b] Total depth at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 were 7.1, 5, 9.3, 13.8, and 14.9 m, respectively, at the time of summer sampling.

* The deepest *in situ* water quality reading at stations DLO-02-6, DLO-02-4, and DLO-02-8 were taken at 6.1, 8.3, and 12.8 m at the time of summer sampling.

Table C.43: *In-situ* water quality profile data collected at Sheardown Lake SE water quality monitoring stations in fall[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	DLO-02-6[b]	DLO-02-7[b]	DLO-02-4[b]	DLO-02-8[b]	DLO-02-3[b]	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3
1.0	10.8	10.7	10.1	11.4	10.5	97.7	96.8	93.5	95.7	96.6	7.02	6.90	6.60	6.96	6.93	169	167	166	166	166
2.0	10.6	10.7	10.1	10.3	10.4	98.4	97.4	94.0	96.0	96.8	7.38	7.08	6.76	7.14	7.13	169	167	166	167	167
3.0	10.4	10.5	10.0	10.2	10.4	98.7	97.2	94.2	95.4	96.7	7.49	7.24	6.96	7.28	7.24	169	167	166	166	167
4.0	10.0		10.0	10.2	10.3	97.1		94.0	95.2	96.8	7.62		7.08	7.37	7.40	171		166	166	167
5.0	9.9		10.0	10.1	10.2	96.3		93.8	94.9	96.5	7.67		7.17	7.44	7.52	171		167	166	167
6.0	9.7		10.0	10.1	10.2	95.5		93.3	94.7	96.0	7.70		7.27	7.47	7.58	172		167	166	167
7.0			9.9	10.1	10.1			93.4	94.4	95.2			7.31	7.51	7.52			167	166	167
8.0			9.8	10.0	10.1			93.2	94.0	94.7			7.35	7.54	7.65			167	166	166
9.0				10.0	10.0				93.8	94.5				7.59	7.66				166	166
10.0				10.0	10.0				92.6	94.6				7.59	7.66				166	166
11.0				9.7	9.9				88.5	91.3				7.57	7.64				NA[c]	165
12.0				9.2	9.6				81.2	88.2				7.53	7.60				161	164
13.0					9.1					80.6					7.56					161
14.0					8.9					73.6					7.47					162

[a] Sampling conducted on 21-August, 2016.

[b] Total depth at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 were 6.8, 3.9, 8.9, 13.2, and 14.4 m, respectively, at the time of fall sampling.

[c] Not Available

Table C.44: Sampling depth, water clarity measures, and surface and bottom *in-situ* water quality measures collected at Sheardown Lake SE benthic invertebrate community stations, Mary River Project CREMP, August 2016.

Replicate ID	Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (pH units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
DLO-02-1	14-Aug-16	11.3	2.0	slightly turbid, beige-green colouration	surface	12.22	10.43	97.3	7.72	111
					bottom	10.02	9.34	83.1	7.51	115
DLO-02-11	14-Aug-16	6.7	2.2	slightly turbid, beige-green colouration	surface	12.62	10.59	99.7	7.95	111
					bottom	11.36	10.39	95.3	7.82	110
DLO-02-9	14-Aug-16	8.2	2.1	slightly turbid, beige-green colouration	surface	12.53	10.56	99.3	7.94	111
					bottom	11.08	10.42	94.8	7.80	108
DLO-02-13	14-Aug-16	12.0	2.2	slightly turbid, beige-green colouration	surface	12.57	10.55	99.1	7.92	113
					bottom	10.09	9.75	86.5	7.68	105
DLO-02-3	14-Aug-16	13.9	2.2	slightly turbid, beige-green colouration	surface	12.25	10.53	92.8	7.87	110
					bottom	9.91	9.15	80.9	7.45	106

Table C.45: Statistical comparison of bottom *in-situ* water quality between littoral stations of Sheardown Lake SE and Reference Lake 3, Mary River Project CREMP, August 2016.

Habitat Variable	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Lake	n	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	Yes	0.000	η, δ, γ	Reference	5	8.88	0.71	0.32	8.10	10.00
				Sheardown SE	5	2.15	0.08	0.04	2.03	2.24
Temperature (˚C)	No	0.144	η, δ, γ	Reference	5	9.92	0.37	0.17	9.50	10.40
				Sheardown SE	5	10.49	0.67	0.30	9.91	11.36
Dissolved Oxygen (mg/L)	No	0.268	α, δ, γ	Reference	5	10.3	0.8	0.4	9.3	11.3
				Sheardown SE	5	9.8	0.6	0.3	9.2	10.4
Dissolved Oxygen (% saturation)	No	0.470	α, δ, γ	Reference	5	91.3	6.7	3.0	82.6	99.1
				Sheardown SE	5	88.1	6.6	3.0	80.9	95.3
pH (units)	No	0.951	α, δ, γ	Reference	5	7.64	0.23	0.10	7.28	7.86
				Sheardown SE	5	7.65	0.17	0.07	7.45	7.82
Specific Conductance (umho/cm)	Yes	0.008	γ	Reference	5	74.0	0.0	0.0	74.0	74.0
				Sheardown SE	5	108.8	4.0	1.8	105.0	115.0

[a] Data analysis included: α - data untransformed; β - data logit transformed; η - log_{10} transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table C.46: Water chemistry at Sheardown Lake SE (DLO-02) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event								
					DL0-02-6-S surface 30-Apr-16	DL0-02-6-B bottom 30-Apr-16	DL0-02-7 surface 29-Apr-16	DL0-02-4-S surface 29-Apr-16	DL0-02-4-B bottom 29-Apr-16	DL0-02-8-S surface 29-Apr-16	DL0-02-8-B bottom 29-Apr-16	DL0-02-3-S surface 29-Apr-16	DL0-02-3-B bottom 29-Apr-16
Conventionals	Conductivity (lab)	umho/cm	-	-	171	167	157	154	150	152	151	156	150
	pH (lab)	pH	6.5 - 9.0	-	7.87	7.84	7.95	7.97	7.98	7.92	7.98	8.00	7.81
	Hardness (as $CaCO_3$)	mg/L	-	-	81	82	77	74	73	75	74	75	74
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	85	85	89	83	81	76	76	79	83
	Turbidity	NTU	-	-	0.30	0.50	0.21	0.24	0.30	0.25	0.49	0.31	0.32
	Alkalinity (as $CaCO_3$)	mg/L	-	-	80	76	76	81	71	14	74	74	70
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	0.056	0.059	0.028	0.022	<0.020	<0.020	0.021	<0.020	0.057
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	3.3	3.6	3.4	3.5	3.9	3.9	3.3	3.6	2.9
	Total Organic Carbon	mg/L	-	-	3.4	2.1	2.2	2.1	1.8	2.0	1.9	2.1	1.7
	Total Phosphorus	mg/L	0.020[α]	-	0.0034	0.0042	0.0044	0.0037	0.0040	0.0047	0.0049	0.0045	0.0092
	Phenols	mg/L	0.004[α]	-	0.0022	0.0011	<0.0010	0.0019	<0.0010	<0.0010	0.0012	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	3.43	3.40	3.14	3.11	3.59	3.09	3.02	3.06	3.17
	Sulphate (SO_4)	mg/L	218[β]	218	3.07	3.01	2.80	2.78	2.72	2.74	2.67	2.74	2.39
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	<0.0030	0.0033	<0.0030	0.0066	<0.0030	<0.0030	<0.0030	<0.0030	0.0035
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00812	0.00840	0.00754	0.00748	0.00705	0.00712	0.00721	0.00721	0.00690
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	16.3	16.4	15.0	14.7	14.5	14.7	14.5	14.9	14.1
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00183
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00087	0.00081	0.00084	0.00091	0.00086	0.00087	0.00080	0.00078	0.00080
	Iron (Fe)	mg/L	0.30	0.300	0.032	0.045	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.040
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	9.96	10.3	9.19	9.24	8.86	9.04	8.95	9.05	8.96
	Manganese (Mn)	mg/L	0.935[β]	-	0.00412	0.00591	0.00211	0.00179	0.00165	0.00166	0.00177	0.00143	0.00482
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000656	0.000588	0.000592	0.000589	0.000595	0.000604	0.000600	0.000621	0.000438
	Nickel (Ni)	mg/L	0.025	0.025	0.00077	0.00079	0.00068	0.00067	0.00068	0.00064	0.00064	0.00061	0.00062
	Potassium (K)	mg/L	-	-	1.27	1.31	1.18	1.19	1.13	1.15	1.14	1.17	1.08
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.73	0.73	0.61	0.56	0.53	0.57	0.56	0.56	0.99
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.58	1.62	1.48	1.50	1.41	1.44	1.43	1.45	1.46
	Strontium (Sr)	mg/L	-	-	0.0109	0.0109	0.00982	0.00996	0.00964	0.00974	0.00963	0.00986	0.00952
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000953	0.000929	0.000887	0.000875	0.000893	0.000877	0.000880	0.000888	0.000665
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	0.0040	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

(grey box) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.46: Water chemistry at Sheardown Lake SE (DLO-02) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event									
					DL0-02-6-S surface 26-Jul-16	DL0-02-6-B bottom 26-Jul-16	DL0-02-7-S surface 26-Jul-16	DL0-02-7-B bottom 26-Jul-16	DL0-02-4-S surface 26-Jul-16	DL0-02-4-B bottom 26-Jul-16	DL0-02-8-S surface 26-Jul-16	DL0-02-8-B bottom 26-Jul-16	DL0-02-3-S surface 26-Jul-16	DL0-02-3-B bottom 26-Jul-16
Conventionals	Conductivity (lab)	umho/cm	-	-	89.3	89.3	87.4	87.9	87.9	88.7	87.1	88	88.0	88.5
	pH (lab)	pH	6.5 - 9.0	-	7.90	7.85	7.87	7.81	7.89	7.81	7.87	7.82	7.87	7.83
	Hardness (as $CaCO_3$)	mg/L	-	-	41	42	42	42	41	41	41	42	42	41
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	2.8	<2.0	9.4	<2.0	9.6
	Total Dissolved Solids (TDS)	mg/L	-	-	56	56	54	54	51	50	49	51	45	46
	Turbidity	NTU	-	-	1.13	1.31	1.08	0.88	0.81	1.74	0.89	6.02	0.91	4.46
	Alkalinity (as $CaCO_3$)	mg/L	-	-	40	40	42	39	41	40	40	43	40	41
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.034	0.040	<0.020
	Nitrate	mg/L	13	13	0.067	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.17	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.1	1.2	1.1	1.1	1.2	1.1	1.1	1.2	1.2	1.1
	Total Organic Carbon	mg/L	-	-	1.4	1.3	1.4	1.2	1.3	1.4	1.3	1.5	1.4	1.4
	Total Phosphorus	mg/L	0.020[α]	-	0.0053	0.0052	0.0049	0.0082	0.0051	0.0081	0.0049	0.0174	0.0164	0.0165
	Phenols	mg/L	0.001[α]	-	0.0018	0.0051	0.0034	0.0022	0.0034	0.0024	0.0017	0.0016	0.0197	0.0013
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.83	1.83	1.79	1.80	1.81	1.75	1.81	1.70	1.79	1.68
	Sulphate (SO_4)	mg/L	218[β]	218	1.81	1.79	1.70	1.69	1.70	1.70	1.72	1.64	1.69	1.64
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0461	0.0255	0.0312	0.0514	0.0268	0.0503	0.0173	0.149	0.0245	0.169
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00466	0.00484	0.00443	0.00502	0.00458	0.00515	0.00437	0.00634	0.00446	0.00632
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	8.07	8.46	8.23	8.55	8.10	8.49	8.06	8.6	8.23	8.59
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00069	0.00064	0.00060	0.00064	0.00081	0.00068	0.00063	0.00089	0.00063	0.00093
	Iron (Fe)	mg/L	0.30	0.300	0.040	0.030	<0.030	0.054	0.031	0.060	<0.030	0.174	<0.030	0.180
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	0.000067	<0.000050	0.000080	<0.000050	0.000238	<0.000050	0.000218
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	5.47	5.27	5.18	5.40	5.23	5.18	5.25	5.33	5.22	5.22
	Manganese (Mn)	mg/L	0.935[β]	-	0.00363	0.00346	0.00321	0.00414	0.00382	0.00509	0.00328	0.006595	0.00335	0.00644
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000334	0.000356	0.000372	0.000340	0.000356	0.000347	0.000363	0.000222	0.000359	0.000238
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.74	0.72	0.72	0.73	0.73	0.72	0.71	0.77	0.72	0.77
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.45	0.40	0.41	0.50	0.40	0.46	0.38	0.68	0.40	0.70
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.922	0.909	0.888	0.921	0.893	0.892	0.871	0.95	0.891	0.943
	Strontium (Sr)	mg/L	-	-	0.00577	0.00597	0.00574	0.00609	0.00562	0.00609	0.00557	0.0065	0.00576	0.00649
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000514	0.000514	0.000478	0.000531	0.000459	0.000526	0.000477	0.000681	0.000473	0.000656
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.46: Water chemistry at Sheardown Lake SE (DLO-02) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event									
					DL0-02-06-S surface 21-Aug-16	DL0-02-06-B bottom 21-Aug-16	DL0-02-07-S surface 21-Aug-16	DL0-02-07 bottom 21-Aug-16	DL0-02-04-S surface 21-Aug-16	DL0-02-04-B bottom 21-Aug-16	DL0-02-08-S surface 21-Aug-16	DL0-02-08-B bottom 21-Aug-16	DL0-02-03-S surface 21-Aug-16	DL0-02-03-B bottom 21-Aug-16
Conventionals	Conductivity (lab)	umho/cm	-	-	117	119	116	116	117	115	115	115	115	111
	pH (lab)	pH	6.5 - 9.0	-	8.11	8.09	8.08	8.12	8.03	7.99	8.07	8.02	8.09	7.73
	Hardness (as $CaCO_3$)	mg/L	-	-	55	56	55	54.5	54	54	54	54	54	53
	Total Suspended Solids (TSS)	mg/L	-	-	3.4	<2.0	<2.0	2.3	2.4	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	58	55	62	57	63	60	61	62	63	62
	Turbidity	NTU	-	-	2.03	2.07	2.27	2.16	2.33	2.56	2.47	2.33	2.28	2.95
	Alkalinity (as $CaCO_3$)	mg/L	-	-	52	52	51	54	50	54	56	50	50	53
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	0.029	<0.020	<0.020	0.044	<0.020	<0.020	0.051
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.024
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.16	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.4	1.5	1.5	1.5	1.5	1.9	1.8	1.3	1.3	1.3
	Total Organic Carbon	mg/L	-	-	2.0	1.8	1.6	2.0	1.6	1.5	1.6	1.7	1.6	1.5
	Total Phosphorus	mg/L	0.020[α]	-	0.0062	0.0065	0.0058	0.0171	0.0060	0.0060	0.0179	0.0059	0.0062	0.0214
	Phenols	mg/L	0.001[α]	-	0.0019	0.0024	0.0026	0.0025	0.0018	0.0021	0.0574	0.0023	<0.0010	0.0291
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.23	2.35	2.32	2.21	2.22	2.24	2.24	2.20	2.26	2.23
	Sulphate (SO_4)	mg/L	218[β]	218	2.67	2.75	2.67	2.64	2.59	2.59	2.63	2.61	2.58	2.56
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.052	0.052	0.049	0.053	0.078	0.061	0.046	0.057	0.047	0.071
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00609	0.00627	0.00649	0.00626	0.00671	0.00647	0.00625	0.00634	0.00624	0.00619
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	10.8	11.3	11.2	11.1	11.1	10.8	11.1	11.1	10.9	10.4
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	<0.0010	0.0010	<0.0010	0.0013	0.0010	0.0011	0.0011	0.0011	0.0010	<0.0010
	Iron (Fe)	mg/L	0.30	0.300	0.055	0.060	0.052	0.053	0.085	0.068	<0.050	0.063	0.051	0.081
	Lead (Pb)	mg/L	0.001	0.001	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	6.30	6.59	6.43	6.35	6.41	6.20	6.35	6.32	6.29	5.92
	Manganese (Mn)	mg/L	0.935[β]	-	0.00339	0.00406	0.00360	0.00370	0.00473	0.00429	0.00363	0.00408	0.00350	0.00772
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000479	0.000515	0.000507	0.000506	0.000500	0.000485	0.000501	0.000490	0.000490	0.000428
	Nickel (Ni)	mg/L	0.025	0.025	0.00065	0.00068	0.00066	0.00074	0.00068	0.00073	0.00070	0.00070	0.00075	0.00063
	Potassium (K)	mg/L	-	-	0.919	0.944	0.918	0.92	0.952	0.903	0.917	0.914	0.906	0.891
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.596	0.777	0.616	0.61	0.697	0.636	0.592	0.641	0.608	0.761
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)	mg/L	-	-	1.12	1.16	1.14	1.13	1.14	1.10	1.12	1.13	1.12	1.10
	Strontium (Sr)	mg/L	-	-	0.0081	0.0085	0.0084	0.0085	0.0085	0.0083	0.0084	0.0085	0.0081	0.0082
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00195	0.00273	0.00195	0.00213	0.00395	0.00258	0.00202	0.00237	0.00224	0.00326
	Uranium (U)	mg/L	0.015	-	0.000784	0.000812	0.000819	0.000803	0.000806	0.000789	0.000795	0.000800	0.000796	0.000700
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	0.0037	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

(grey shading) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.47: Dissolved metals concentrations at Sheardown Lake SE water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Winter Sampling Event									Summer Sampling Event					
			DL0-02-6-S surface 30-Apr-16	DL0-02-6-B bottom 30-Apr-16	DL0-02-7 surface 29-Apr-16	DL0-02-4-S surface 29-Apr-16	DL0-02-4-B bottom 29-Apr-16	DL0-02-8-S surface 29-Apr-16	DL0-02-8-B bottom 29-Apr-16	DL0-02-3-S surface 29-Apr-16	DL0-02-3-B bottom 29-Apr-16	DL0-02-6-S surface 26-Jul-16	DL0-02-6-B bottom 26-Jul-16	DL0-02-7-S surface 26-Jul-16	DL0-02-7-B bottom 26-Jul-16	DL0-02-4-S surface 26-Jul-16	DL0-02-4-B bottom 26-Jul-16
Dissolved Metals	Aluminum (Al)	mg/L	0.00109	0.00142	0.00111	0.00121	0.00106	0.00097	0.00127	0.00118	0.00108	0.0058	0.0046	0.0051	0.0061	0.0042	0.0059
	Antimony (Sb)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.000073	0.000068	0.000059	0.000096	0.000070	0.000057	0.000061	0.000073	0.000064	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00813	0.00791	0.00733	0.00711	0.00698	0.00723	0.00711	0.00724	0.00697	0.00431	0.00463	0.00418	0.00455	0.00416	0.00455
	Beryllium (Be)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.0059	0.0058	0.0056	0.0055	0.0053	0.0054	0.0054	0.0055	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	16.2	16.0	15.3	14.9	14.5	14.9	14.7	14.7	14.5	8.25	8.33	8.23	8.32	8.02	8.08
	Chromium (Cr)	mg/L	<0.00010	<0.00010	0.00041	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0000122	0.0000110	0.0000099	0.0000139	0.0000095	0.0000120	0.0000086	0.0000091	0.0000091	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00086	0.00090	0.00084	0.00090	0.00081	0.00084	0.00080	0.00080	0.00078	0.00063	0.00059	0.00057	0.00056	0.00059	0.00064
	Iron (Fe)	mg/L	0.0061	0.0068	0.0061	0.0030	0.0024	0.0025	0.0025	0.0023	0.0034	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.0000090	<0.0000090	<0.0000090	<0.0000090	<0.0000090	<0.0000090	<0.0000090	<0.0000090	<0.0000090	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00105	0.00091	0.00106	0.00078	0.00095	0.00086	0.00100	0.00099	0.00093	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	9.96	10.1	9.45	9.00	8.98	9.21	9.12	9.41	9.08	5.07	5.13	5.1	5.16	5.11	4.99
	Manganese (Mn)	mg/L	0.00115	0.000712	0.000480	0.000390	0.000201	0.000390	0.000296	0.000333	0.00234	0.000347	0.000217	0.000298	0.000254	0.000206	0.000503
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000649	0.000608	0.000623	0.000616	0.000594	0.000600	0.000615	0.000617	0.000459	0.000447	0.000347	0.000348	0.000347	0.000365	0.000334
	Nickel (Ni)	mg/L	0.000749	0.000749	0.000657	0.000660	0.000598	0.000648	0.000633	0.000652	0.000551	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	1.28	1.29	1.20	1.14	1.13	1.17	1.16	1.18	1.10	0.72	0.73	0.72	0.74	0.73	0.72
	Selenium (Se)	mg/L	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.746	0.725	0.579	0.560	0.548	0.566	0.552	0.565	0.986	0.36	0.36	0.37	0.39	0.35	0.39
	Silver (Ag)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.58	1.61	1.48	1.43	1.42	1.47	1.45	1.49	1.49	0.917	0.929	0.91	0.941	0.904	0.915
	Strontium (Sr)	mg/L	0.0107	0.0107	0.0100	0.00985	0.00966	0.00964	0.00964	0.00973	0.00950	0.0058	0.00594	0.0058	0.00613	0.00583	0.00604
	Thallium (Tl)	mg/L	0.0000023	0.0000027	<0.0000020	0.0000028	0.0000028	0.0000026	0.0000024	<0.0000020	<0.0000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.000030	<0.000030	<0.000030	<0.000030	<0.000030	<0.000030	<0.000030	<0.000030	<0.000030	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000952	0.000919	0.000899	0.000900	0.000856	0.000911	0.000887	0.000891	0.000710	0.000516	0.000502	0.000467	0.000504	0.000453	0.000468
	Vanadium (V)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.00050	0.00088	0.00069	0.00107	0.00132	0.00084	0.00099	0.00117	0.00096	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.003

Table C.47: Dissolved metals concentrations at Sheardown Lake SE water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Summer Sampling Event				Fall Sampling Event									
			DL0-02-8-S surface 26/Jul/2016	DL0-02-8-B bottom 26/Jul/2016	DL0-02-3-S surface 26/Jul/2016	DL0-02-3-B bottom 26/Jul/2016	DL0-02-06-S surface 21/Aug/2016	DL0-02-06-B bottom 21/Aug/2016	DL0-02-07-S surface 21/Aug/2016	DL0-02-07 bottom 21/Aug/2016	DL0-02-04-S surface 21/Aug/2016	DL0-02-04-B bottom 21/Aug/2016	DL0-02-08-S surface 21/Aug/2016	DL0-02-08-B bottom 21/Aug/2016	DL0-02-03-S surface 21/Aug/2016	DL0-02-03-B bottom 21/Aug/2016
Dissolved Metals	Aluminum (Al)	mg/L	0.0052	0.009	0.0046	0.0064	0.0093	0.0170	0.0081	0.0090	0.0091	0.0077	0.0072	0.0082	0.0081	0.0079
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00426	0.004825	0.0042	0.00467	0.00597	0.00643	0.00601	0.00596	0.00600	0.00601	0.00595	0.00607	0.00593	0.00596
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	8.22	8.425	8.23	8.24	11.0	11.7	11.2	11.1	11.1	10.9	11.0	10.9	10.8	10.8
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.0006	0.00057	0.00058	0.00058	0.00076	0.00105	0.00094	0.00080	0.00069	0.00081	0.00084	0.00081	0.00076	0.00079
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000072	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	5.01	5.07	5.15	5.02	6.76	6.42	6.49	6.56	6.33	6.42	6.51	6.45	6.62	6.44
	Manganese (Mn)	mg/L	0.000286	0.000375	0.000196	0.000411	0.000561	0.00115	0.000440	0.00039	0.000283	0.000272	0.000414	0.000188	0.000376	0.000392
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000354	0.000311	0.00037	0.000326	0.000489	0.000507	0.000511	0.000471	0.000492	0.000480	0.000473	0.000489	0.000465	0.000447
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00071	<0.00050	<0.00050	0.00051	0.00051	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.73	0.72	0.74	0.7	0.90	0.92	0.91	0.91	0.90	0.89	0.89	0.89	0.90	0.89
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.36	0.455	0.36	0.44	0.56	0.54	0.56	0.55	0.55	0.55	0.56	0.55	0.55	0.63
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.9	0.9555	0.915	0.938	1.23	1.24	1.19	1.18	1.20	1.19	1.16	1.14	1.20	1.22
	Strontium (Sr)	mg/L	0.00574	0.00631	0.00574	0.00621	0.00807	0.00864	0.00835	0.00817	0.00833	0.00824	0.00812	0.00814	0.00807	0.00812
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000493	0.0005795	0.000487	0.00056	0.000836	0.000810	0.000821	0.000820	0.000801	0.000810	0.000819	0.000814	0.000821	0.000765
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	0.003	<0.0030	<0.0030	<0.0030	0.0057	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.48: *In-situ* water quality measurements collected at Mary River benthic invertebrate community stations, Mary River Project CREMP, August 2016.

Study Area	Station	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	pH (pH units)	Specific Conductance (µS/cm)
Mary River Upstream (GO-09)	GO-09 B1	9.9	10.98	97.0	7.98	134
	GO-09 B2	9.2	11.25	97.8	7.97	133
	GO-09 B3	8.6	11.36	97.3	7.99	132
	GO-09 B4	8.0	11.55	97.6	7.94	132
	GO-09 B5	7.0	11.81	97.4	7.90	132
Mary River Upstream (GO-03)	GO-03 B1	12.7	10.22	96.5	8.00	122
	GO-03 B2	12.6	10.36	97.4	7.99	122
	GO-03 B3	12.3	10.44	97.7	7.99	122
	GO-03 B4	12.1	10.52	97.8	7.97	122
	GO-03 B5	11.8	10.55	97.5	7.97	121
Mary River Downstream (EO-01)	EO-01 B1	10.6	11.13	99.8	7.98	135
	EO-01 B2	9.9	11.27	99.6	7.96	136
	EO-01 B3	9.6	11.33	99.4	7.93	136
	EO-01 B4	9.3	11.49	100.3	7.95	137
	EO-01 B5	9.0	11.50	99.5	7.94	137
Mary River Downstream (EO-20)	EO-20 B1	8.6	11.70	100.2	7.94	138
	EO-20 B2	8.4	11.63	99.1	7.94	138
	EO-20 B3	8.0	11.87	100.3	7.93	138
	EO-20 B4	7.7	11.84	99.3	7.94	138
	EO-20 B5	7.7	11.79	98.9	7.85	139
Mary River Downstream (CO-05)	CO-05 B1	8.7	11.33	97.3	7.79	138
	CO-05 B2	8.9	11.41	98.4	7.81	138
	CO-05 B3	8.9	11.45	98.6	7.83	138
	CO-05 B4	9.0	11.50	99.4	7.83	138
	CO-05 B5	9.2	11.54	100.4	7.86	138

Table C.49: *In-situ* water quality summary for Mary River benthic invertebrate community study areas, Mary River Project CREMP, August 2016.

Metric	Station	Sample Size	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
						Lower Bound	Upper Bound		
Temperature (˚C)	GO-09	5	8.54	1.11	0.50	7.16	9.92	7.00	9.90
	GO-03	5	12.30	0.37	0.16	11.84	12.76	11.80	12.70
	EO-01	5	9.68	0.61	0.27	8.92	10.44	9.00	10.60
	EO-20	5	8.08	0.41	0.18	7.57	8.59	7.70	8.60
	CO-05	5	8.94	0.18	0.08	8.71	9.17	8.70	9.20
Dissolved Oxygen (mg/L)	GO-09	5	11.4	0.3	0.1	11.0	11.8	11.0	11.8
	GO-03	5	10.4	0.1	0.1	10.3	10.6	10.2	10.6
	EO-01	5	11.3	0.2	0.1	11.2	11.5	11.1	11.5
	EO-20	5	11.8	0.1	0.0	11.6	11.9	11.6	11.9
	CO-05	5	11.4	0.1	0.0	11.3	11.5	11.3	11.5
Dissolved Oxygen (% saturation)	GO-09	5	97.4	0.3	0.1	97.0	97.8	97.0	97.8
	GO-03	5	97.4	0.5	0.2	96.7	98.0	96.5	97.8
	EO-01	5	99.7	0.4	0.2	99.3	100.2	99.4	100.3
	EO-20	5	99.6	0.6	0.3	98.8	100.4	98.9	100.3
	CO-05	5	98.8	1.2	0.5	97.4	100.3	97.3	100.4
pH (pH units)	GO-09	5	7.96	0.04	0.02	7.91	8.00	7.90	7.99
	GO-03	5	7.98	0.01	0.01	7.97	8.00	7.97	8.00
	EO-01	5	7.95	0.02	0.01	7.93	7.98	7.93	7.98
	EO-20	5	7.92	0.04	0.02	7.87	7.97	7.85	7.94
	CO-05	5	7.82	0.03	0.01	7.79	7.86	7.79	7.86
Specific Conductance (uS/cm)	GO-09	5	132.7	1.0	0.5	131.4	134.0	131.7	134.2
	GO-03	5	122.0	0.5	0.2	121.3	122.6	121.3	122.4
	EO-01	5	136.0	0.5	0.2	135.4	136.6	135.4	136.5
	EO-20	5	138.1	0.3	0.1	137.7	138.4	137.8	138.5
	CO-05	5	137.8	0.2	0.1	137.5	138.0	137.5	138.1

Table C.50: Statistical comparison of *in-situ* water quality variables among Mary River benthic invertebrate community study areas, Mary River Project CREMP, August 2016.

In-situ Variable	Overall 5-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Areas?	p-value	Statistical Test[b]	(I) Area	(J) Area	Significant Difference Between 2 Areas?	p-value	Statistical Test
Temperature (˚C)	YES	0.00000	α , δ	GO-09	GO-3	YES	0.0092	Tamhane's
				GO-09	EO-01	NO	0.6103	
				GO-09	EO-20	NO	0.9960	
				GO-09	CO-05	NO	0.9982	
				GO-03	EO-01	YES	0.0011	
				GO-03	EO-20	YES	0.0000	
				GO-03	CO-05	YES	0.0000	
				EO-01	EO-20	YES	0.0187	
				EO-01	CO-05	NO	0.4152	
				EO-20	CO-05	YES	0.0599	
Dissolved Oxygen (% Saturation)	YES	0.00001	α , δ	GO-09	GO-3	NO	1.0000	Tukey's HSD
				GO-09	EO-01	YES	0.0002	
				GO-09	EO-20	YES	0.0005	
				GO-09	CO-05	YES	0.0261	
				GO-03	EO-01	YES	0.0002	
				GO-03	EO-20	YES	0.0004	
				GO-03	CO-05	YES	0.0213	
				EO-01	EO-20	NO	0.9953	
				EO-01	CO-05	NO	0.2492	
				EO-20	CO-05	NO	0.4304	
pH (pH units)	YES	0.00000	α , δ	GO-09	GO-3	NO	0.5485	Tukey's HSD
				GO-09	EO-01	NO	0.9994	
				GO-09	EO-20	NO	0.3092	
				GO-09	CO-05	YES	0.0000	
				GO-03	EO-01	NO	0.4209	
				GO-03	EO-20	YES	0.0161	
				GO-03	CO-05	YES	0.0000	
				EO-01	EO-20	NO	0.4209	
				EO-01	CO-05	YES	0.0000	
				EO-20	CO-05	YES	0.0003	
Specific Conductance (umho/cm)	YES	0.00000	α , δ	GO-09	GO-3	YES	0.0000	Tamhane's
				GO-09	EO-01	YES	0.0086	
				GO-09	EO-20	YES	0.0018	
				GO-09	CO-05	YES	0.0029	
				GO-03	EO-01	YES	0.0000	
				GO-03	EO-20	YES	0.0000	
				GO-03	CO-05	YES	0.0000	
				EO-01	EO-20	YES	0.0016	
				EO-01	CO-05	YES	0.0057	
				EO-20	CO-05	NO	0.5632	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed; β - data logit transformed; η - $\log_{10}$ transformed; δ - single factor ANOVA test conducted; γ - ANOVA test validated using Kruskal Wallis H-test or Mann Whitney U-test, as appropriate

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table C.51: Water chemistry at Mary River water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Spring Sampling Event										
					G0-09-A	G0-09	G0-09-B	G0-03	G0-01	E0-03	E0-20	E0-21	C0-10	C0-05	C0-01
					26-Jun-2016	26-Jun-2016	26-Jun-2016	25-Jun-2016	26-Jun-2016	26-Jun-2016	25-Jun-2016	25-Jun-2016	25-Jun-2016	25-Jun-2016	25-Jun-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	18.2	19	23	19.7	19.8	20.8	19.5	18.4	19.95	28.9	26.9
	pH (lab)	pH	6.5 - 9.0	-	7.08	7.09	7.17	7.22	7.15	7.18	7.2	7.08	7.21	7.31	7.33
	Hardness (as $CaCO_3$)	mg/L	-	-	<10	<10	10	<10	<10	<10	<10	<10	<10	13	12
	Total Suspended Solids (TSS)	mg/L	-	-	15.6	8.8	6.4	5.2	4	4.8	4.4	8.8	2.8	2.8	6.9
	Total Dissolved Solids (TDS)	mg/L	-	-	<10	13	13	<10	<10	10	<10	<10	<10	<10	<10
	Turbidity	NTU	-	-	12	8.82	5.54	5.57	4.33	4.07	4.67	5.27	3.945	4.34	4.85
	Alkalinity (as $CaCO_3$)	mg/L	-	-	<10	11	13	<10	<10	13	10	<10	11.5	18	14
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	0.031	0.024	<0.020	<0.020	<0.020	<0.020	0.021	<0.020	0.0405	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	<1.0	1	1.1	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Organic Carbon	mg/L	-	-	<1.0	1	1.2	1.2	1.1	1.3	1.1	1.1	1.05	1.2	1.5
	Total Phosphorus	mg/L	0.020[α]	-	0.0192	0.0146	0.0097	0.009	0.0078	0.0114	0.0065	0.0119	0.0073	0.0077	0.0088
	Phenols	mg/L	0.004[α]	-	0.0024	0.0033	0.0029	0.0025	0.0031	0.0026	0.0015	0.0014	0.0014	0.002	0.0018
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	0.76	0.66	0.7	0.58	0.59	0.58	0.59	0.59	0.67	0.77	0.71
	Sulphate (SO_4)	mg/L	218[β]	218	0.32	<0.30	0.31	<0.30	<0.30	<0.30	0.37	0.35	0.44	0.54	0.44
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.250	0.185	0.158	0.113	0.080	0.079	0.088	0.095	0.087	0.070	0.090
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00372	0.00284	0.00291	0.00248	0.00209	0.00201	0.00208	0.00216	0.001975	0.00233	0.00247
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	1.9	1.8	2.14	1.92	1.8	1.93	1.77	1.36	1.85	2.67	2.47
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00057	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	0.00018	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00076	0.00059	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)	mg/L	0.30	0.874	0.322	0.142	0.117	0.124	0.073	0.069	0.085	0.091	0.0835	0.062	0.087
	Lead (Pb)	mg/L	0.001	0.001	0.000359	0.000207	0.000145	0.000135	0.000096	0.000102	0.000119	0.000109	0.0001045	0.000094	0.000131
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	1.15	1.03	1.24	1.12	1.01	1.13	0.998	0.952	1.09	1.59	1.49
	Manganese (Mn)	mg/L	0.935[β]	-	0.00763	0.00399	0.00301	0.00334	0.002	0.00228	0.00266	0.00297	0.00242	0.00275	0.00328
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000071	0.000061
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.32	0.29	0.32	0.25	0.24	0.25	0.23	0.22	0.225	0.29	0.28
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.68	0.54	0.6	0.43	0.37	0.34	0.34	0.34	0.35	0.31	0.36
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.425	0.377	0.463	0.353	0.349	0.341	0.333	0.315	0.359	0.418	0.401
	Strontium (Sr)	mg/L	-	-	0.00219	0.00204	0.00243	0.00176	0.0018	0.00185	0.00172	0.00131	0.00172	0.00222	0.00215
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.018	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000197	0.000146	0.000149	0.000115	0.00011	0.000103	0.000099	0.000087	0.0000965	0.000152	0.000139
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Mary River system.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.51: Water chemistry at Mary River water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event												
					G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-20	E0-21	C0-10	C0-05	C0-01
					18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	54.2	62.3	58.7	59.1	60.7	149	76.3	61.6	63.9	61.45	66.5	62.5	68.3
	pH (lab)	pH	6.5 - 9.0	-	7.75	7.82	7.79	7.81	7.84	8.13	7.88	7.79	7.76	7.775	7.62	7.82	7.89
	Hardness (as $CaCO_3$)	mg/L	-	-	23	27	26	26	27	71	34	27	28	27	27	28	30
	Total Suspended Solids (TSS)	mg/L	-	-	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	30	33	30	31	32	83	40	26	33	30	35	38	38
	Turbidity	NTU	-	-	12.1	9.24	9.47	7.35	6.93	3.96	6.51	7.43	7.3	7.465	7.95	8.42	5.26
	Alkalinity (as $CaCO_3$)	mg/L	-	-	29	38	36	36	31	75	42	34	32	37	35	34	35
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	<0.020	0.077	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.35000	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Organic Carbon	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Phosphorus	mg/L	0.020[α]	-	0.0086	0.0063	0.0067	0.0048	0.007	0.0046	0.012	0.0079	0.0055	0.0062	0.0059	0.0066	0.0043
	Phenols	mg/L	0.004[α]	-	0.0013	0.0016	0.0017	0.0018	0.0017	0.0014	0.0015	0.0019	<0.0010	0.00145	0.0011	0.0015	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.23	1.25	1.19	1.08	1.07	1.39	1.13	1.05	1.04	1.03	1.04	1.08	1.10
	Sulphate (SO_4)	mg/L	218[β]	218	0.8	0.8	0.8	0.7	0.8	5.1	1.5	0.9	0.9	0.9	0.9	1.0	1.0
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.3030	0.230	0.178	0.171	0.245	0.1010	0.213	0.234	0.249	0.252	0.239	0.228	0.224
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0056	0.0054	0.0051	0.0051	0.0054	0.0076	0.0058	0.0056	0.0058	0.0057	0.0055	0.0055	0.0058
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	5	6	5	6	6	15	7	6	6	6	6	6	6
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.0008	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
	Iron (Fe)	mg/L	0.30	0.874	0.208	0.158	0.127	0.115	0.147	0.069	0.128	0.145	0.152	0.160	0.152	0.148	0.127
	Lead (Pb)	mg/L	0.001	0.001	0.00025	0.00019	0.00017	0.00013	0.00016	0.00010	0.00015	0.00017	0.00017	0.00018	0.00018	0.00018	0.00013
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	2.72	3.18	3	3.07	3.16	8.3	4.1	3.13	3.39	3.225	3.29	3.28	3.63
	Manganese (Mn)	mg/L	0.935[β]	-	0.00244	0.00181	0.00170	0.00131	0.00158	0.00102	0.00140	0.00159	0.00170	0.00175	0.00177	0.00213	0.00179
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.00015	0.00014	0.00012	0.00014	0.00015	0.00019	0.00015	0.00017	0.00018	0.00018	0.00017	0.00017	0.00019
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.68	0.68	0.64	0.63	0.66	0.83	0.69	0.64	0.69	0.67	0.67	0.67	0.72
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	1.07	0.99	0.79	0.80	0.99	0.79	0.93	0.99	0.95	1.01	0.98	0.89	0.95
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.948	1.010	0.973	0.928	0.929	0.828	0.902	0.861	0.914	0.879	0.906	0.877	0.976
	Strontium (Sr)	mg/L	-	-	0.006	0.006	0.006	0.006	0.006	0.009	0.007	0.006	0.006	0.006	0.006	0.006	0.006
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.0120	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.0006	0.0006	0.0006	0.0005	0.0005	0.0013	0.0006	0.0005	0.0004	0.0004	0.0004	0.0004	0.0005
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Mary River system.

[shaded] Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.51: Water chemistry at Mary River water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event												
					G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	CO-01
					20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	191	189	188	168.5	174	261	186	174	172	173	170	171	170
	pH (lab)	pH	6.5 - 9.0	-	8.23	8.24	8.21	8.135	8.14	8.28	8.14	8.12	8.17	8.16	8.13	8.15	8.15
	Hardness (as $CaCO_3$)	mg/L	-	-	80	84	82	75.5	79	131	84	80	80	79	79	79	79
	Total Suspended Solids (TSS)	mg/L	-	-	5.4	2.9	2.9	2.95	2.5	3	2.9	<2.0	3.4	3.5	5.6	6.9	2.5
	Total Dissolved Solids (TDS)	mg/L	-	-	107	98	98	94.5	69	141	102	90	86	90	94	99	89
	Turbidity	NTU	-	-	16.3	9.7	11	12.25	16.1	11	16.5	12.9	16	14.6	32.7	41.5	15.5
	Alkalinity (as $CaCO_3$)	mg/L	-	-	73	79	79	73.5	75	118	82	70	68	72	76	76	72
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	0.032	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.026	0.039	0.065	0.022	0.022
	Nitrate	mg/L	13	13	0.023	<0.020	<0.020	<0.020	<0.020	0.096	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	0.15	<0.15	0.16	0.25	0.15	<0.15	0.21	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.2	1.3	1.1	1.25	1.3	1.2	1.2	1.2	1.8	1.2	1.6	1.9	1.5
	Total Organic Carbon	mg/L	-	-	1.5	1.4	1.4	1.5	1.5	1.4	2.3	1.3	1.5	1.4	1.6	1.8	1.6
	Total Phosphorus	mg/L	0.020[α]	-	0.0125	0.009	0.0107	0.00885	0.0098	0.0112	0.0117	0.0097	0.0157	0.0097	0.0358	0.0206	0.0102
	Phenols	mg/L	0.004[α]	-	0.0056	0.0063	0.0086	0.0048	0.0037	0.0057	0.0058	0.0039	0.016	0.0042	0.0552	0.0039	0.004
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	11.5	9	9.29	6.995	6.92	5.57	6.74	6.56	6.08	6.55	6.09	6.08	6.1
	Sulphate (SO_4)	mg/L	218[β]	218	5.58	4.52	4.64	3.77	4.59	14.3	5.01	4.38	4.19	4.36	5.03	5.15	4.03
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.395	0.217	0.258	0.291	0.484	0.251	0.418	0.301	0.431	0.382	***1.04***	***1.39***	0.32
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	0.00013	<0.00010	<0.00010	0.00011	0.00013	0.00015	0.00014	0.00012	0.00014	0.00012	0.0002	0.00026	0.00013
	Barium (Ba)	mg/L	-	-	0.0147	0.013	0.0131	0.0126	0.0142	0.0148	0.0143	0.0133	0.0143	0.0133	0.0174	0.0196	0.0129
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	17	17.8	18	15.7	16.9	27	17.5	17.1	16.9	16.7	16.5	16.5	15.8
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00096	0.0006	0.00065	0.00073	0.0011	0.00108	0.00112	0.00076	0.00108	0.00096	0.00237	0.00319	0.00086
	Cobalt (Co)	mg/L	0.0009[α]	0.004	0.0002	0.00012	0.00014	0.00015	0.00023	0.00024	0.00022	0.00016	0.00022	0.00018	0.00048	0.00065	0.00018
	Copper (Cu)	mg/L	0.002	0.0024	0.0017	0.0017	0.0015	0.0015	0.0016	0.0019	0.0016	0.0016	0.0016	0.0015	0.0024	***0.0027***	0.0017
	Iron (Fe)	mg/L	0.30	0.874	0.41	0.227	0.278	0.298	0.471	0.325	0.437	0.308	0.442	0.383	***1.07***	***1.42***	0.356
	Lead (Pb)	mg/L	0.001	0.001	0.00036	0.00025	0.00024	0.00029	0.00041	0.00042	0.0004	0.00031	0.00039	0.00034	0.00083	***0.00108***	0.00033
	Lithium (Li)	mg/L	-	-	0.001	<0.0010	<0.0010	<0.0010	0.0011	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	0.0017	0.0024	<0.0010
	Magnesium (Mg)	mg/L	-	-	9.32	9.46	9.21	8.855	9.18	15.9	10.2	9.58	9.4	9.18	9.66	9.72	9.17
	Manganese (Mn)	mg/L	0.935[β]	-	0.0056	0.0030	0.0036	0.0036	0.0055	0.0050	0.0053	0.0040	0.0054	0.0047	0.0121	0.0167	0.0053
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.00063	0.00051	0.00053	0.00043	0.00046	0.00034	0.00043	0.00052	0.00053	0.00053	0.00053	0.00057	0.00046
	Nickel (Ni)	mg/L	0.025	0.025	0.00079	0.00067	0.00059	0.00073	0.00102	0.00148	0.00111	0.00092	0.00117	0.00103	0.00241	0.00259	0.00114
	Potassium (K)	mg/L	-	-	1.68	1.45	1.45	1.34	1.42	1.46	1.44	1.43	1.4	1.41	1.7	1.88	1.38
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	1.55	1.27	1.34	1.33	1.73	1.25	1.56	1.35	1.66	1.5	2.74	3.62	1.41
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)	mg/L	-	-	5.67	4.57	4.56	3.71	3.69	2.2	3.54	3.59	3.35	3.46	3.42	3.4	3.33
	Strontium (Sr)	mg/L	-	-	0.0234	0.0211	0.0216	0.0179	0.0184	0.0197	0.0188	0.0184	0.0179	0.0182	0.0187	0.0188	0.0165
	Thallium (Tl)	mg/L	0.0008	0.0008	0.000014	0.000011	0.000012	0.0000105	0.000014	0.000013	0.000015	0.000011	0.000015	0.000014	0.000027	0.000036	0.000013
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.0233	0.0124	0.0156	0.01615	0.0271	0.0156	0.0245	0.0164	0.0248	0.0212	0.0611	0.0822	0.0185
	Uranium (U)	mg/L	0.015	-	0.00657	0.00577	0.0058	0.004605	0.00468	0.00353	0.0043	0.00453	0.00406	0.00441	0.00406	0.00407	0.00364
	Vanadium (V)	mg/L	0.006[α]	0.006	0.00099	0.00063	0.00074	0.000735	0.00104	0.00078	0.00101	0.00075	0.00098	0.00092	0.00208	0.00274	0.00082
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0031	0.005	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Mary River system.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.52: Dissolved metal concentrations at Mary River water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Spring Sampling Event													Summer Sampling Event						
			G0-09A	G0-09	G0-09B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-20	E0-21	C0-10	C0-05	C0-01	GO-09-A	GO-09	GO-09-B	GO-03	GO-01	FO-01	EO-10
			26-Jun-2016	26-Jun-2016	26-Jun-2016	25-Jun-2016	26-Jun-2016	26-Jun-2016	26-Jun-2016	26-Jun-2016	25-Jun-2016	25-Jun-2016	25-Jun-2016	25-Jun-2016	25-Jun-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016
Dissolved Metals	Aluminum (Al)	mg/L	0.0215	0.0214	0.0159	0.0118	0.0126	0.0082	0.0096	0.0099	0.0092	0.0111	0.011	0.0106	0.0122	0.0380	0.0271	0.0308	0.0223	0.0246	0.0045	0.0193
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00139	0.00142	0.00182	0.00149	0.00149	0.00166	0.00153	0.00146	0.00141	0.00132	0.00144	0.00177	0.00174	0.00358	0.00390	0.00383	0.00391	0.00402	0.00683	0.00446
	Beryllium (Be)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	1.44	1.64	2.09	1.74	1.77	3.55	2.30	1.87	1.76	1.59	1.7	2.63	2.34	4.89	5.80	5.37	5.49	5.65	14.6	7.11
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00031	0.00034	0.00031	0.00033	0.00032	0.00021	0.00070	0.00031	0.00028	0.00029	0.00027	0.00035	0.00033	<0.00050	<0.00050	0.00052	<0.00050	<0.00050	0.00051	0.00051
	Iron (Fe)	mg/L	0.013	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.011	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	0.896	1.01	1.25	1.04	1.03	2.28	1.35	1.11	1.01	0.975	1.06	1.62	1.45	2.66	3.12	2.96	3.03	3.16	8.46	3.95
	Manganese (Mn)	mg/L	0.00164	0.00134	0.00108	0.00125	0.00085	0.00057	0.00080	0.00082	0.00097	0.00103	0.00096	0.00142	0.00132	0.000219	0.000181	0.000174	0.000140	0.000151	0.000094	0.000128
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000075	0.000065	0.000186	0.000162	0.000156	0.000161	0.000157	0.000183	0.000162
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.224	0.237	0.279	0.219	0.219	0.238	0.221	0.224	0.196	0.206	0.21	0.284	0.263	0.57	0.59	0.58	0.57	0.58	0.80	0.60
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.250	0.270	0.308	0.261	0.253	0.213	0.238	0.246	0.217	0.205	0.23	0.242	0.246	0.50	0.52	0.51	0.49	0.50	0.58	0.51
	Silver (Ag)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.942	0.995	0.979	0.913	0.920	0.839	0.881
	Strontium (Sr)	mg/L	0.0016	0.0017	0.0022	0.0016	0.0017	0.0021	0.0018	0.0017	0.0015	0.0015	0.0016	0.0022	0.0020	0.00587	0.00618	0.00590	0.00561	0.00573	0.00919	0.00634
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	0.00060	0.00062	0.00049	<0.00030	0.00042	<0.00030	<0.00030	<0.00030	<0.00030	0.00034	<0.00030	<0.00030	0.00034	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000085	0.000079	0.000102	0.000070	0.000079	0.000064	0.000077	0.000073	0.000072	0.000066	0.000067	0.000116	0.000102	0.000507	0.000564	0.000525	0.000439	0.000446	0.00125	0.000559
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.52: Dissolved metal concentrations at Mary River water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units							Fall Sampling Event												
			EO-03	E0-20	E0-21	C0-10	C0-05	C0-01	G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-20	E0-21	C010	C0-05	C0-01
			18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	18-Jul-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	20-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016	19-Aug-2016
Dissolved Metals	Aluminum (Al)	mg/L	0.0242	0.0232	0.0243	0.0222	0.0227	0.0195	0.0116	0.0079	0.0092	0.0080	0.0093	0.0037	0.0085	0.0071	0.0091	0.0097	0.0088	0.0096	0.0085
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00407	0.00421	0.00416	0.00417	0.00428	0.00450	0.0119	0.0113	0.0112	0.0105	0.0112	0.0132	0.0112	0.0107	0.0107	0.0108	0.0108	0.0110	0.0110
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	5.69	5.87	5.7	5.74	5.78	6.35	16.9	17.6	17.6	15.8	16.4	26.6	17.6	16.8	16.5	16.6	16.4	16.3	16.4
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	0.00052	0.00103	0.00091	0.00096	0.00091	0.00086	0.00079	0.00086	0.00088	0.00093	0.00089	0.00092	0.00095	0.00097
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	3.15	3.32	3.14	3.19	3.21	3.50	9.21	9.79	9.28	8.81	9.34	15.6	9.80	9.20	9.30	9.02	9.28	9.29	9.32
	Manganese (Mn)	mg/L	0.000121	0.000155	0.00014	0.000241	0.000723	0.000430	0.000372	0.000193	0.000226	0.00013	0.000137	0.000417	0.000159	0.000162	0.000360	0.000139	0.000310	0.00109	0.000726
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000180	0.000192	0.000182	0.000184	0.000187	0.000197	0.000620	0.000489	0.000516	0.000416	0.000427	0.000342	0.000419	0.000505	0.000506	0.000534	0.000528	0.000529	0.000502
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00051	0.00057	0.00057
	Potassium (K)	mg/L	0.57	0.58	0.57	0.57	0.60	0.61	1.51	1.35	1.35	1.21	1.23	1.33	1.25	1.27	1.24	1.23	1.24	1.27	1.26
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.48	0.49	0.49	0.49	0.48	0.50	0.89	0.90	0.91	0.87	0.89	0.81	0.86	0.90	0.91	0.89	0.90	0.94	0.93
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.874	0.893	0.86	0.872	0.874	0.947	5.69	4.82	4.77	3.70	3.75	2.21	3.55	3.61	3.43	3.43	3.36	3.34	3.46
	Strontium (Sr)	mg/L	0.00576	0.00576	0.0057	0.00560	0.00574	0.00622	0.0213	0.0198	0.0211	0.0167	0.0170	0.0186	0.0171	0.0173	0.0166	0.0173	0.0166	0.0162	0.0162
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000375	0.000375	0.000375	0.000349	0.000337	0.000417	0.00631	0.00559	0.00564	0.004280	0.00417	0.00318	0.00407	0.00390	0.00355	0.00394	0.00349	0.00332	0.00341
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.53: *In-situ* water quality profile data collected at Mary Lake water quality monitoring stations in winter[a], Mary River Project CREMP, 2016.

Station BLO-01-A (North Basin)[b,c]					Station BLO-01 (North Basin)[b,c]					Station BLO-01-B (North Basin)[b,c]					Station BLO-05-A (South Basin)[b,c]					Station BLO-05 (South Basin)[b,c]				
Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)
3.15	0.5	96.2	7.8	216.5	2.90	0.4	97.4	7.7	231.3	3.00	0.3	95.3	7.7	225.5	2.50	0.6	100.3	7.7	89.3	2.30	1.0	100.6	7.8	90.1
4.15	0.7	96.1	7.8	215.0	3.90	0.5	97.4	7.7	228.1	4.00	0.4	95.8	7.6	223.9	3.50	0.8	101.5	7.7	88.0	3.30	1.0	101.8	7.8	87.7
5.15	0.8	95.5	7.7	213.3	4.90	0.7	97.3	7.7	227.3	5.00	0.6	93.2	7.6	223.5	4.50	1.2	101.5	7.7	87.2	4.30	1.2	101.7	7.7	86.8
6.15	1.1	90.0	7.7	212.0	5.90	0.8	97.0	7.7	225.4						5.50	1.3	101.4	7.7	87.0	5.30	1.3	101.1	7.7	86.4
7.15	1.2	87.1	7.6	212.7	6.90	0.9	96.9	7.7	225.2						6.50	1.4	100.4	7.7	86.0	6.30	1.4	100.2	7.7	85.0
8.15	1.1	87.0	7.6	212.0	7.90	1.0	96.1	7.7	223.7						7.50	1.5	100.1	7.7	85.6	7.30	1.5	99.2	7.7	84.1
9.15	1.2	83.1	7.6	211.1	8.90	1.1	94.1	7.7	222.8						8.50	1.5	99.5	7.7	85.1	8.30	1.5	98.2	7.7	83.5
10.15	1.4	74.7	7.5	209.8											9.50	1.5	99.2	7.7	84.5	9.30	1.5	97.6	7.7	83.2
11.15	1.5	62.0	7.5	209.4											10.50	1.5	98.7	7.7	84.3	10.30	1.6	97.2	7.7	83.0
12.15	1.6	38.8	7.4	211.4											11.50	1.6	97.5	7.7	84.1	11.30	1.6	96.8	7.7	82.6
13.15	1.7	23.3	7.3	212.6																12.30	1.6	96.4	7.7	82.5
14.15	1.8	11.2	7.2	216.2																13.30	1.6	96.1	7.7	82.2
16.15	1.9	4.8	7.1	221.8																14.30	1.7	95.2	7.7	81.6
																				15.30	1.7	94.8	7.7	81.7
																				16.30	1.7	94.2	7.7	82.6
																				17.30	1.7	92.1	7.6	82.1
																				18.30	1.7	91.6	7.6	81.7
																				19.30	1.7	90.4	7.6	82.2
																				20.30	1.8	89.4	7.6	82.4

[a] Sampling conducted on 25-April, 6-May and 16-May, 2016.

[b] Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 were 15.7, 10.1, 5, 12.4, 21.3, 7.3, 17.8, 21.8, 30, and 7.8 m, respectively, at the time of winter sampling.

[c] Ice thickness at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 were 1.65, 1.90, 1.50, 1.48, 1.33, 1.50, 1.32, 1.40, 1.46, and 1.65 m, respectively, at the time of winter sampling.

Table C.53: *In-situ* water quality profile data collected at Mary Lake water quality monitoring stations in winter[a], Mary River Project CREMP, 2016.

Station BLO-05-B (South Basin)[b,c]					Station BLO-03 (South Basin)[b,c]					Station BLO-04 (South Basin)[b,c]					Station BLO-09 (South Basin)[b,c]					Station BLO-06 (South Basin)[b,c]				
Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)	Depth (m)	Temp. (°C)	DO (% Sat.)	pH	Sp. Cond. (µS/cm)
2.50	1.0	104.0	7.8	95.6	2.65	0.8	98.9	7.7	88.4	2.50	1.1	101.5	7.7	92.5	3.00	1.1	98.7	7.8	88.0	2.60	1.8	100.8	7.9	93.0
3.50	1.2	105.6	7.7	93.4	3.65	1.2	99.7	7.6	86.7	3.50	1.2	100.5	7.7	88.3	4.00	1.1	99.1	7.8	87.2	3.60	1.0	102.1	7.8	90.8
4.50	1.2	106.1	7.7	93.1	4.65	1.3	99.9	7.6	86.4	4.50	1.3	100.1	7.6	86.2	5.00	1.4	99.1	7.7	86.0	4.60	1.2	101.9	7.8	90.0
5.50	1.3	105.9	7.7	92.7	5.65	1.4	99.7	7.6	85.7	5.50	1.4	99.7	7.6	85.4	6.00	1.4	98.8	7.7	85.0	5.60	1.4	101.5	7.7	88.7
6.50	1.3	106.0	7.7	93.9	6.65	1.5	99.2	7.6	85.1	6.50	1.5	99.1	7.6	84.6	7.00	1.5	98.3	7.7	84.4	6.60	1.5	100.8	7.7	88.3
					7.65	1.5	98.7	7.6	84.4	7.50	1.6	98.5	7.6	84.1	8.00	1.5	98.0	7.7	84.3					
					8.65	1.6	97.9	7.6	83.6	8.50	1.6	97.8	7.6	83.3	9.00	1.6	97.3	7.6	83.6					
					9.65	1.6	96.9	7.5	83.2	9.50	1.6	96.8	7.6	82.9	10.00	1.6	97.0	7.6	83.4					
					10.65	1.6	96.8	7.5	82.9	10.50	1.6	96.7	7.6	82.8	11.00	1.6	96.8	7.6	83.3					
					11.65	1.7	96.1	7.5	82.3	11.50	1.6	96.3	7.6	82.5	12.00	1.6	96.4	7.6	82.8					
					12.65	1.7	95.7	7.5	82.3	12.50	1.6	95.8	7.6	82.2	13.00	1.6	96.9	7.6	82.5					
					13.65	1.7	95.5	7.5	81.9	13.50	1.7	94.9	7.6	81.9	14.00	1.6	95.4	7.6	82.2					
										14.50	1.7	94.5	7.6	81.6	15.00	1.7	94.7	7.6	82.0					
										15.50	1.7	93.6	7.5	81.3	16.00	1.7	93.6	7.6	81.4					
										16.50	1.8	93.0	7.5	81.0	17.00	1.8	93.0	7.5	81.2					
										17.50	1.8	92.0	7.5	80.9	18.00	1.8	92.9	7.5	81.1					
										18.50	1.8	91.1	7.5	81.2	19.00	1.8	90.5	7.5	80.9					
										19.50	1.8	90.7	7.5	81.5	20.00	1.8	88.6	7.5	80.7					
										20.50	1.8	90.3	7.5	82.0	21.00	1.9	87.8	7.5	80.6					
															22.00	1.9	85.9	7.5	80.6					
															23.00	2.0	84.3	7.4	81.0					
															24.00	2.0	83.6	7.4	81.3					
															25.00	2.0	81.7	7.4	81.7					
															26.00	2.1	78.2	7.4	81.9					
															27.00	2.2	75.8	7.3	82.5					
															28.00	2.2	68.8	7.3	84.0					
															29.00	2.3	65.0	7.2	84.8					

[a] Sampling conducted on 25-April, 6-May and 16-May, 2016.

[b] Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 were 15.7, 10.1, 5, 12.4, 21.3, 7.3, 17.8, 21.8, 30, and 7.8 m, respectively, at the time of winter sampling.

[c] Ice thickness at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 were 1.65, 1.90, 1.50, 1.48, 1.33, 1.50, 1.32, 1.40, 1.46, and 1.65 m, respectively, at the time of winter sampling.

Table C.54: *In-situ* water quality profile data collected at Mary Lake water quality monitoring stations in summer[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)										Dissolved Oxygen (% Saturation)									
	BLO-01-A[b]	BLO-01[b]	BLO-01-B[b]	BLO-05-A[b]	BLO-05[b]	BLO-05-B[b]	BLO-03[b]	BLO-04[b]	BLO-09[b]	BLO-06[b]	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06
1.0	9.8	10.1	9.8	10.8	11.1	9.1	10.9	10.5	10.0	8.1	100.1	100.2	100.3	99.5	100.3	98.1	102.4	103.4	102.4	99.4
2.0	9.5	10.1	9.8	10.7	10.5	8.9	10.9	10.5	9.8	8.1	100.1	100.3	100.3	101.1	100.7	99.0	104.0	103.5	102.8	99.5
3.0	9.4	10.0	9.5	10.7	10.3	8.8	10.9	10.4	9.6	8.0	99.9	100.2	100.5	101.6	101.2	99.2	104.3	103.4	102.9	99.4
4.0	9.4	9.8	9.4	10.7	10.3	8.8	10.9	9.9	9.6	8.0	99.8	99.6	100.4	101.9	101.4	99.4	104.2	102.9	102.7	99.4
5.0	9.3	9.6	9.3	10.7	10.1	8.7	10.9	9.8	9.2	8.0	99.7	99.7	100.1	102.1	101.1	99.2	104.2	102.7	101.6	99.1
6.0	9.1	9.6		10.6	9.8	8.6	10.9	9.8	8.8	7.5	100.0	99.8		102.1	100.2	99.1	104.2	102.5	101.0	98.0
7.0	9.1	9.5		10.0	9.3	8.6	10.9	9.6	8.7		100.0	99.7		100.8	99.7	99.1	104.1	101.6	100.7	
8.0	9.1	9.5		9.6	9.0	8.6*	10.9	9.4	8.7		100.1	99.7		99.8	99.2	98.7*	103.9	101.5	100.5	
9.0	9.1	9.3		9.4	9.0		9.2	9.2	8.6		100.0	99.3		99.5	99.2		101.0	100.0	99.9	
10.0	9.0			9.2	9.0		8.8	8.6	8.4		99.9			99.1	99.3		100.3	99.4	99.6	
11.0	9.0			8.2	8.0		8.8	8.3	8.4		99.8			97.3	97.1		100.4	99.0	99.4	
12.0	9.0				7.8		8.7	8.1	8.3		99.8				96.8		100.2	98.7	99.2	
13.0	9.0				7.6		8.6	8.0	8.2		99.7				96.2		100.0	98.4	99.0	
14.0	8.8				7.5		8.6	7.9	8.1		99.7				96.0		99.6	98.0	98.5	
15.0	8.7				7.3		8.4	7.5	7.9		99.8				95.5		99.3	97.0	98.1	
16.0					7.1		8.4	7.5	7.9						95.1		99.2	96.5	97.7	
17.0					7.1			7.4	7.6						94.6			96.1	97.0	
18.0					7.0			7.3	7.4						94.4			95.9	96.7	
19.0					7.0			7.2	7.3						94.3			96.0	96.4	
20.0					7.0			7.2	7.1						94.2			95.8	96.1	
21.0					6.9*				7.1						93.5*				96.0	
22.0									6.6										94.7	
23.0									6.6										94.6	
24.0									6.5										94.4	
25.0									6.5										94.3	
26.0									6.5										94.1	
27.0									6.5										94.0	
28.0									6.4										93.8	
29.0									6.4										93.5	
30.0									6.3										93.1	

[a] Sampling conducted on 26-July, 29-July and 30-July, 2016.
[b] Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 were 16.9, 9.95, 5.14, 11, 21.7, 8.5, 19.9, 21, 30.5, 8.2 m, respectively, at the time of summer sampling.
* The deepest *in situ* water quality reading at stations BL0-05 and BL0-05-B were taken at 21.7 m and 7.5 m, respectively, at the time of summer sampling.

Table C.54: *In-situ* water quality profile data collected at Mary Lake water quality monitoring stations in summer[a], Mary River Project CREMP, 2016.

Depth (m)	pH (pH units)										Specific Conductance (µS/cm)									
	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06
1.0	7.63	7.83	7.68	7.71	7.63	7.27	7.65	7.75	7.82	7.70	185.5	180.1	189.5	69.0	82.0	57.0	57.2	61.3	57.9	54.3
2.0	7.66	7.80	7.72	7.76	7.60	7.03	7.64	7.71	7.77	7.59	191.0	179.8	191.2	69.0	69.0	58.0	57.2	61.1	57.9	54.4
3.0	7.69	7.81	7.74	7.68	7.59	6.86	7.65	7.69	7.71	7.54	191.7	182.2	191.2	70.0	64.0	58.0	57.2	58.0	57.8	54.4
4.0	7.69	7.80	7.76	7.68	7.58	6.41	7.64	7.67	7.71	7.50	192.7	187.6	192.3	70.0	66.0	59.0	57.3	57.4	57.4	54.5
5.0	7.71	7.80	7.77	7.70	7.57	6.38	7.65	7.63	7.67	7.48	195.1	187.8	193.2	70.0	72.0	59.0	57.3	57.4	56.4	54.5
6.0	7.71	7.80		7.70	7.57	6.38	7.65	7.62	7.64	7.46	195.4	188.0		71.0	67.0	59.0	57.3	57.4	56.2	54.2
7.0	7.72	7.81		7.69	7.57	6.39	7.66	7.61	7.61		195.6	188.7		69.0	62.0	59.0	57.3	57.7	56.2	
8.0	7.73	7.81		7.67	7.56	6.40*	7.66	7.59	7.60		195.9	189.2		73.0	62.0	59.0*	57.3	57.5	56.2	
9.0	7.74	7.80		7.66	7.54		7.66	7.58	7.59		196.8	192.7		70.0	61.0		56.2	57.4	55.8	
10.0	7.75			7.63	7.51		7.60	7.54	7.57		198.1			66.0	62.0		56.1	56.4	55.7	
11.0	7.75			7.61	7.50		7.56	7.51	7.55		198.3			60.0	58.0		56.0	56.5	55.7	
12.0	7.76				7.45		7.54	7.50	7.55		198.3				58.0		56.0	56.5	55.5	
13.0	7.76				7.41		7.53	7.49	7.53		199.6				57.0		56.0	56.6	55.4	
14.0	7.76				7.38		7.51	7.48	7.51		203.6				58.0		56.0	56.7	55.6	
15.0	7.76				7.36		7.51	7.44	7.50		205.3				57.0		56.1	57.9	55.4	
16.0					7.32		7.51	7.42	7.48						57.0		56.1	58.3	54.9	
17.0					7.12			7.42	7.47						57.0			57.5	54.7	
18.0					6.89			7.41	7.45						57.0			57.0	54.6	
19.0					6.83			7.39	7.43						57.0			56.9	54.4	
20.0					6.80			7.39	7.42						57.0			57.2	54.2	
21.0					6.77*				7.41						58.0*				54.1	
22.0									7.40										53.7	
23.0									7.39										53.7	
24.0									7.37										53.9	
25.0									7.36										53.7	
26.0									7.35										53.7	
27.0									7.35										53.7	
28.0									7.34										53.7	
29.0									7.33										53.8	
30.0									7.33										53.8	

[a] Sampling conducted on 26-July, 29-July and 30-July, 2016.

[b] Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 were 16.9, 9.95, 5.14, 11, 21.7, 8.5, 19.9, 21, 30.5, 8.2 m, respectively, at the time of summer sampling.

* The deepest *in situ* water quality reading at stations BL0-05 and BL0-05-B were taken at 21.7 m and 7.5 m, respectively, at the time of summer sampling.

Table C.55: *In-situ* water quality profile data collected at Mary Lake water quality monitoring stations in fall[a], Mary River Project CREMP, 2016.

Depth (m)	Temperature (°C)										Dissolved Oxygen (% Saturation)									
	BLO-01-A[b]	BLO-01[b]	BLO-01-B[b]	BLO-05-A[b]	BLO-05[b]	BLO-05-B[b]	BLO-03[b]	BLO-04[b]	BLO-09[b]	BLO-06[b]	BLO-01-A[b]	BLO-01[b]	BLO-01-B[b]	BLO-05-A[b]	BLO-05[b]	BLO-05-B[b]	BLO-03[b]	BLO-04[b]	BLO-09[b]	BLO-06[b]
1.0	10.4	10.1	10.2	11.1	11.3	11.2	11.0	10.5	10.5	9.9	99.8	98.9	100.1	98.1	99.0	98.5	99.3	97.1	98.9	93.5
2.0	10.0	10.0	10.1	11.1	11.3	11.2	10.9	10.5	10.5	10.8	100.1	99.6	99.8	98.8	99.2	99.3	99.8	98.0	99.2	95.8
3.0	9.9	9.9	9.9	11.1	11.2	11.2	10.9	10.4	10.5	9.7	99.7	99.6	99.8	98.9	99.2	99.5	99.8	98.7	99.2	96.7
4.0	9.7	9.9	9.8	11.0	11.1	11.1	10.9	10.4	10.3	9.7	99.4	99.5	99.4	98.9	99.1	99.4	99.7	99.0	99.1	97.0
5.0	9.5	9.8		11.0	11.0	11.0	10.7	10.4	10.2	9.6	99.0	99.3		98.7	98.8	98.8	99.4	99.2	98.8	97.1
6.0	9.4	9.7		10.9	10.8	10.7	10.6	10.4	10.2	9.6	98.8	99.1		98.6	98.3	98.5	99.0	99.1	98.7	97.1
7.0	9.3	9.6		10.9	10.7	10.6	10.6	10.2	10.1	9.5	98.5	98.6		98.6	97.8	98.3	98.9	98.8	98.6	96.7
8.0	9.3	9.5		10.9	10.5		10.5	9.9	10.1	9.4	98.4	98.1		98.5	98.0		98.7	98.1	98.4	96.3
9.0	9.2	9.4*		10.9	10.5		10.4	9.5	10.0		97.8	97.8*		98.5	97.8		98.5	97.1	98.4	
10.0	9.2			10.7	10.2		10.4	9.3	10.0		97.7			97.9	97.0		98.5	96.6	98.3	
11.0	9.2			10.3*	9.6		10.3	9.1	10.0		97.4			96.7*	95.8		97.8	96.1	98.2	
12.0	9.1				9.3		10.0	9.1	9.1		97.5				95.1		97.0	96.0	96.1	
13.0	9.1				9.2		8.8	9.0	8.9		97.6				93.7		95.4	96.0	95.8	
14.0	9.1				8.4		8.8	8.8	9.0		97.6				91.5		94.3	95.1	95.8	
15.0					7.9		8.7	8.7	8.9						90.1		94.2	94.9	96.0	
16.0					7.5		8.5	8.2	7.7						89.5		93.9	93.5	93.4	
17.0					7.4		8.4	7.7	7.5						89.7		93.6	92.2	92.8	
18.0					7.3			7.1	7.3						89.5			91.9	92.3	
19.0					7.2			7.4	7.2						89.0			91.1	92.0	
20.0					7.2			7.0	7.0						88.5			90.3	91.6	
21.0									6.7										90.7	
22.0									6.6										90.3	
23.0									6.4										90.1	
24.0									6.4										89.7	
25.0									6.3										89.6	
26.0									6.2										89.5	
27.0									6.2										89.3	
28.0									6.1										88.8	
29.0									6.1										88.5	
30.0									6.1										88.2	

[a] Sampling conducted on 21-August to 24-August, 2016.

[b] Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 were 14.9, 9.2, 4.7, 11.5, 20.6, 7.6, 19.5, 21.1, 30.2, and 9.7 m, respectively, at the time of fall sampling.

* The deepest *in situ* water quality reading at stations BLO-1 and BLO-05A were taken at 8.2 and 10.5 m, respectively, at the time of fall sampling.

Table C.55: *In-situ* water quality profile data collected at Mary Lake water quality monitoring stations in fall[a], Mary River Project CREMP, 2016.

Depth (m)	pH (pH units)										Specific Conductance (µS/cm)									
	BLO-01-A[b]	BLO-01[b]	BLO-01-B[b]	BLO-05-A[b]	BLO-05[b]	BLO-05-B[b]	BLO-03[b]	BLO-04[b]	BLO-09[b]	BLO-06[b]	BLO-01-A[b]	BLO-01[b]	BLO-01-B[b]	BLO-05-A[b]	BLO-05[b]	BLO-05-B[b]	BLO-03[b]	BLO-04[b]	BLO-09[b]	BLO-06[b]
1.0	8.11	8.06	8.05	8.08	8.00	8.04	7.72	7.90	7.78	8.01	149	150	149	78	73	75	72		73	
2.0	8.01	7.96	7.99	7.95	7.93	7.92	7.70	7.83	7.74	7.89	149	149	148	78	75	75	71		73	
3.0	8.00	7.95	8.00	7.91	7.88	7.87	7.69	7.76	7.73	7.81	149	148	146	79	76	75	71		73	
4.0	7.98	7.94	8.00	7.87	7.88	7.84	7.68	7.72	7.70	7.75	150	148	146	80	77	74	71		73	
5.0	7.96	7.93		7.84	7.82	7.80	7.66	7.68	7.68	7.67	153	147		80	76	74	71		73	
6.0	7.95	7.92		7.81	7.79	7.77	7.65	7.64	7.67	7.66	154	150		81	75	74	71		73	
7.0	7.94	7.91		7.77	7.75	7.74	7.63	7.60	7.66	7.64	154	151		81	81	73	70		72	
8.0	7.92	7.90		7.77	7.71		7.63	7.56	7.64	7.61	154	151		81	84		70		72	
9.0	7.91	7.89*		7.76	7.70		7.62	7.50	7.63		154	151		81	88		70		73	
10.0	7.92			7.73	7.70		7.60	7.45	7.62		153			81	85		69		71	
11.0	7.91			7.70*	7.67		7.58	7.38	7.62		153			80	81		69		72	
12.0	7.90				7.63		7.57	7.36	7.62		153				79		67		71	
13.0	7.96				7.62		7.45	7.35	7.58		154				69		63		67	
14.0	7.91				7.60		7.44	7.35	7.54		154				61		62		65	
15.0					7.54		7.42	7.32	7.52						57		61		62	
16.0					7.50		7.40	7.33	7.50						55		60		60	
17.0					7.45		7.38	7.30	7.46						54		60		57	
18.0					7.43			7.26	7.44						53				56	
19.0					7.41			7.23	7.41						53				55	
20.0					7.39			7.20	7.39						53				54	
21.0									7.37										53	
22.0									7.35										53	
23.0									7.33										53	
24.0									7.31										53	
25.0									7.28										53	
26.0									7.26										53	
27.0									7.22										53	
28.0									7.15										53	
29.0									7.08										55	
30.0									7.03										56	

[a] Sampling conducted on 21-August to 24-August, 2016.

[b] Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 were 14.9, 9.2, 4.7, 11.5, 20.6, 7.6, 19.5, 21.1, 30.2, and 9.7 m, respectively, at the time of fall sampling.

* The deepest *in situ* water quality reading at stations BLO-1 and BLO-05A were taken at 8.2 and 10.5 m, respectively, at the time of fall sampling.

Table C.56: Sampling depth, water clarity measures, and surface and bottom in-situ water quality measures collected at Mary Lake benthic invertebrate community stations, Mary River Project CREMP, August 2016.

Replicate ID	Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
BLO-01	15-Aug-16	9.6	3.99	-	surface	12.07	10.75	99.9	8.13	132
					bottom	9.82	10.63	93.8	7.94	120
BLO-20	15-Aug-16	11.3	2.86	slight blue-green colouration	surface	12.32	11.18	104.4	7.72	73
					bottom	10.07	11.02	97.8	7.72	73
BLO-11	15-Aug-16	11.6	3.06	-	surface	12.64	11.76	108.4	7.86	73
					bottom	9.94	11.69	102.5	7.82	80
BLO-21	15-Aug-16	11.2	3.26	slight blue-green colouration	surface	13.42	10.31	98.7	7.50	74
					bottom	9.23	7.79	63.7	7.27	71
BLO-22	15-Aug-16	11.3	3.72	slight blue-green colouration	surface	12.92	10.65	100.8	6.87	75
					bottom	9.35	11.11	97.4	7.19	69
BLO-06	15-Aug-16	9.1	3.85	slight blue-green colouration	surface	13.23	10.95	104.3	7.77	71
					bottom	12.63	8.39	77.4	7.44	71

Table C.57: Statistical comparison of bottom *in-situ* water quality between littoral stations of Mary Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

Habitat Variable	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	*p* -value	Statistical Analysis[a]	Lake	N	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	Yes	0.001	α, δ, γ	Reference	5	8.88	0.71	0.32	8.10	10.00
				Mary	6	3.46	0.46	0.19	2.86	3.99
Temperature (˚C)	No	0.931	γ	Reference	5	9.92	0.37	0.17	9.50	10.40
				Mary	6	10.17	1.25	0.51	9.23	12.63
Dissolved Oxygen (mg/L)	No	0.769	α, δ, γ	Reference	5	10.3	0.8	0.4	9.3	11.3
				Mary	6	10.1	1.6	0.7	7.8	11.7
Dissolved Oxygen (% saturation)	No	0.734	α, δ, γ	Reference	5	91.3	6.7	3.0	82.6	99.1
				Mary	6	88.8	15.0	6.1	63.7	102.5
pH (units)	No	0.640	α, δ, γ	Reference	5	7.64	0.23	0.10	7.28	7.86
				Mary	6	7.56	0.31	0.13	7.19	7.94
Specific Conductance (umho/cm)	No	0.429	γ	Reference	5	74.0	0.0	0.0	74.0	74.0
				Mary	6	80.7	19.6	8.0	69.0	120.0

[a] Data analysis included: α - data untransformed; β - data logit transformed; η - log_{10} transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Kruskal Wallis H-test or Mann Whitney U-test, as appropriate.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table C.58: Water chemistry at Mary Lake north basin (BLO-01) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event					Spring	Summer Sampling Event							Fall Sampling Event						
					BL0-01-A(S)	BL0-01-A(B)	BL0-01 (S)	BL0-01 (B)	BL0-01-B	I0-01	I0-01	BL0-01-A-S	BL0-01-A-B	BL0-01-S	BL0-01-B	BL0-01-B-S	BL0-01-B-B	I0-01	BL0-01A-S	BL0-01A-B	BL0-01-S	BL0-01-B	BL0-01B-S	BL0-01B-B
					surface	bottom	surface	bottom	surface	river	river	surface	bottom	surface	bottom	surface	bottom	river	surface	bottom	surface	bottom	surface	bottom
					25-Apr-2016	25-Apr-2016	1-May-2016	1-May-2016	25-Apr-2016	25-Jun-2016	20-Jul-2016	26-Jul-2016	26-Jul-2016	26-Jul-2016	26-Jul-2016	26-Jul-2016	26-Jul-2016	19-Aug-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016	21-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	222	220	231	227	231	27.9	85.4	90.4	96.2	86.9	90.7	91.0	93	194	158	166	160	164	159	156
	pH (lab)	pH	6.5 - 9.0	-	7.85	7.31	8.08	8.13	7.86	7.45	7.86	7.89	7.93	7.88	7.91	7.94	7.89	8.24	8.17	8.12	8.12	8.13	8.14	8.17
	Hardness (as $CaCO_3$)	mg/L	-	-	110	107	116	109	113	13	43	43	46	41	44	44	45	95	76	81	76	79	77	73
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	2.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	147	147	130	131	152	13	47700	49	52	45	49	47	48	98	86	93	85	83	82	80
	Turbidity	NTU	-	-	0.22	0.81	0.48	0.34	0.27	3.88	1.70	0.94	0.94	0.99	1.00	0.88	5.06	0.44	1.48	1.12	1.24	1.19	1.31	1.71
	Alkalinity (as $CaCO_3$)	mg/L	-	-	112	109	112	106	110	12	42	46	46	45	49	44	50	94	77	79	77	82	79	78
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	0.064	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.021	<0.020	0.043	0.071	<0.020	<0.020
	Nitrate	mg/L	13	13	0.071	0.164	0.070	0.068	0.068	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	3.7	3.2	4.1	4.0	4.0	1.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.7	1.8	1.7	1.8	1.7	1.8	1.9
	Total Organic Carbon	mg/L	-	-	2.5	2.4	2.6	2.5	2.6	1.1	1.5	1.0	<1.0	<1.0	1.0	1.0	1.1	1.8	2.1	1.9	1.8	1.8	1.9	1.8
	Total Phosphorus	mg/L	0.020[α]	-	0.0039	0.0050	0.0033	<0.0030	0.0041	0.0062	<0.0030	0.0061	0.0050	0.0046	0.0044	0.0052	0.0055	<0.0030	<0.0030	0.0035	0.0035	0.0041	0.0030	0.0037
	Phenols	mg/L	0.004[α]	-	0.0013	<0.0010	0.0018	0.0019	0.0018	0.0027	0.0016	0.0010	0.0044	0.0019	0.0023	0.0016	0.0034	0.0041	0.0028	0.0028	0.0018	0.0018	0.0023	0.0024
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	5.84	5.61	5.97	5.78	5.93	0.69	1.08	1.17	1.13	1.16	1.16	1.17	1.20	5.51	3.18	3.76	3.24	3.54	3.21	3.06
	Sulphate (SO_4)	mg/L	218[β]	218	2.74	2.14	2.82	2.71	2.77	<0.30	0.52	0.55	0.59	0.54	0.56	0.58	0.63	1.95	1.36	1.50	1.39	1.45	1.37	1.32
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	0.0036	0.0036	<0.0030	<0.0030	0.0041	0.0923	0.0629	0.0321	0.0395	0.0330	0.0403	0.0387	0.0323	0.0104	0.028	0.024	0.030	0.029	0.024	0.028
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0103	0.00990	0.0113	0.0108	0.0107	0.00240	0.00487	0.00475	0.00530	0.00462	0.00522	0.00493	0.00529	0.00976	0.00764	0.00811	0.00774	0.00791	0.00817	0.00816
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	21.4	21.5	22.8	22.2	23.0	2.71	8.62	9.05	9.59	8.24	9.19	9.19	9.3	18.9	15.1	16.0	15.3	15.5	16.0	14.9
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00072	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00126	0.00082	0.00118	0.00117	0.00118	<0.00050	0.00053	0.00060	0.00063	0.00056	0.00065	0.00058	0.00059	0.00099	<0.0010	<0.0010	0.0011	0.0010	0.0011	0.0010
	Iron (Fe)	mg/L	0.30	0.326	<0.030	0.076	<0.030	<0.030	<0.030	0.096	0.038	0.030	0.041	0.032	0.033	0.031	0.033	<0.030	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000130	<0.000050	<0.000050	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.0012	0.0012	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	13.4	12.8	13.7	13.2	13.8	1.61	5.15	5.38	6.00	5.13	5.38	5.66	5.62	11.4	8.51	8.92	8.57	8.73	8.66	8.39
	Manganese (Mn)	mg/L	0.935[β]	-	0.00134	0.0293	0.00187	0.00219	0.00223	0.00363	0.000636	0.00306	0.00264	0.00260	0.00263	0.00242	0.002315	0.000319	0.00452	0.00561	0.00465	0.00574	0.00482	0.00470
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000345	0.000250	0.000329	0.000309	0.000344	<0.000050	0.000091	0.000097	0.000098	0.000088	0.000109	0.000107	0.000098	0.000238	0.000219	0.000217	0.000209	0.000227	0.000217	0.000205
	Nickel (Ni)	mg/L	0.025	0.025	0.00204	0.00139	0.00064	0.00061	0.00153	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00053	<0.00050	0.00052	0.00055	0.00056	0.00054
	Potassium (K)	mg/L	-	-	1.25	1.16	1.27	1.21	1.30	0.29	0.55	0.56	0.58	0.54	0.59	0.59	0.57	1.04	0.862	0.898	0.882	0.886	0.887	0.857
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	1.01	1.80	1.13	1.13	1.09	0.42	0.74	0.62	0.66	0.59	0.64	0.63	0.65	0.86	0.812	0.805	0.822	0.800	0.843	0.831
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)	mg/L	-	-	3.26	3.05	3.26	3.14	3.30	0.405	0.933	0.954	0.962	0.921	0.970	0.973	0.96	3.20	1.93	2.12	1.97	2.03	1.97	1.90
	Strontium (Sr)	mg/L	-	-	0.0149	0.0141	0.0152	0.0146	0.0156	0.00200	0.00559	0.00595	0.00623	0.00552	0.00603	0.00604	0.0061	0.0130	0.0109	0.0112	0.0109	0.0112	0.0112	0.0108
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.00095	0.00088	0.00118	0.00109	0.00087	0.00094
	Uranium (U)	mg/L	0.015	-	0.00252	0.00189	0.00262	0.00258	0.00268	0.000086	0.000508	0.000496	0.000645	0.000472	0.000552	0.000549	0.000569	0.00253	0.00152	0.00174	0.00153	0.00160	0.00155	0.00146
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intinsik (2013) using baseline water quality data specific to Mary Lake.

(grey shading) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.59: Water chemistry at Mary Lake south basin (BLO) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event													
					BL0-05-A-S surface 1-May-2016	BL0-05-A-B bottom 1-May-2016	BL0-05-S surface 1-May-2016	BL0-05-B bottom 1-May-2016	BL0-05-B-S surface 1-May-2016	BL0-05-B-B bottom 1-May-2016	BL0-03-S surface 6-May-2016	BL0-03-B bottom 6-May-2016	BL0-04-S surface 6-May-2016	BL0-04-B bottom 6-May-2016	BL0-09-S surface 6-May-2016	BL0-09-B bottom 6-May-2016	BL0-06-S surface 6-May-2016	BL0-06-B bottom 6-May-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	91.4	84.8	91.0	83.6	97.8	95.1	88.0	83.0	94.8	80.7	89.3	83	90.8	88.2
	pH (lab)	pH	6.5 - 9.0	-	7.78	7.89	7.87	7.85	7.93	7.91	7.60	7.62	7.58	7.55	7.53	7.28	7.61	7.61
	Hardness (as $CaCO_3$)	mg/L	-	-	44	41	44	40	47	46	45	39	47	40	44	41.5	45	43
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	53	51	45	45	50	47	48	52	49	39	42	45	26	49
	Turbidity	NTU	-	-	0.26	0.12	0.12	0.27	0.27	0.41	<0.10	0.10	<0.10	0.11	0.11	0.20	0.11	<0.10
	Alkalinity (as $CaCO_3$)	mg/L	-	-	44	40	42	40	45	43	37	37	41	35	44	41	44	44
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	0.029	0.027	0.030	0.037	0.033	0.026	0.028	0.028	0.030	0.031	0.032	0.0725	0.029	0.030
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15		<0.15	<0.15	<0.15	0.18	0.16	0.16	<0.15
	Dissolved Organic Carbon	mg/L	-	-	3.1	3.3	3.3	2.7	3.1	3.2	1.5	1.4	1.5	1.4	1.5	1.3	1.7	1.5
	Total Organic Carbon	mg/L	-	-	1.5	1.6	1.7	2.1	2.7	1.6	1.7	1.5	1.7	1.6	1.7	1.5	1.7	1.6
	Total Phosphorus	mg/L	0.020[α]	-	<0.0030	0.0045	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0037	0.0054	<0.0030
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	0.0019	<0.0010	0.0019	<0.0010	<0.0010	0.0011	0.0015	0.0014	<0.0010	0.0015	<0.0010	0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.87	1.72	1.87	1.67	2.03	1.91	1.79	1.63	1.93	1.66	1.87	1.93	1.87	1.85
	Sulphate (SO_4)	mg/L	218[β]	218	1.13	1.05	1.13	1.03	1.21	1.17	1.05	0.97	1.16	1.01	1.15	1.02	1.15	1.16
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	<0.0030	0.0039	0.0049	0.0054	0.0060	0.0047	<0.0030	0.0031	<0.0030	0.0041	0.0035	0.0068	0.0068	0.0031
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00486	0.00480	0.00517	0.00482	0.00555	0.00544	0.00482	0.00444	0.00530	0.00462	0.00499	0.00484	0.00535	0.00491
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	8.65	8.41	9.04	8.19	9.37	9.26	8.70	8.07	9.45	8.21	8.95	8.1	8.98	8.82
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00061	0.00064	0.00075	0.00066	0.00084	0.00074	0.00071	0.00062	0.00072	0.00072	0.00068	0.00066	0.00077	0.00064
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	5.22	4.85	5.26	4.81	5.65	5.45	5.13	4.76	5.55	4.79	5.31	4.76	5.29	5.17
	Manganese (Mn)	mg/L	0.935[β]	-	0.000336	0.000429	0.000376	0.000699	0.000474	0.000669	0.000455	0.000404	0.000364	0.000522	0.000355	0.000819	0.000469	0.000392
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000022	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000171	0.000158	0.000169	0.000156	0.000176	0.000174	0.000150	0.000141	0.000179	0.000146	0.000166	0.000143	0.000167	0.000171
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.68	0.62	0.67	0.60	0.74	0.70	0.69	0.62	0.74	0.63	0.70	0.62	0.70	0.68
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.36	0.34	0.37	0.39	0.38	0.38	0.37	0.35	0.38	0.34	0.36	0.67	0.36	0.35
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.22	1.15	1.25	1.12	1.35	1.28	1.23	1.14	1.34	1.17	1.29	1.26	1.29	1.24
	Strontium (Sr)	mg/L	-	-	0.00680	0.00659	0.00709	0.00650	0.00735	0.00713	0.00683	0.00626	0.00743	0.00647	0.00711	0.0065	0.00715	0.00705
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000714	0.000687	0.000726	0.000615	0.000748	0.000733	0.000635	0.000596	0.000732	0.000635	0.000703	0.000501	0.000699	0.000702
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	0.0031	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intinsik (2013) using baseline water quality data specific to Mary Lake.

(grey box) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.59: Water chemistry at Mary Lake south basin (BLO) water quality monitoring stations, Mary River Project CREMP, 2016.

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event													
					BL0-05-A-S	BL0-05-A-B	BL0-05-S	BL0-05-B	BL0-05-B-S	BL0-05-B-B	BL0-03-S	BL0-03-B	BL0-04-S	BL0-04-B	BL0-09-S	BL0-09-B	BL0-06-S	BL0-06-B
					surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom
					30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	29-Jul-2016	29-Jul-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	68.1	55.8	61.8	56.5	55.9	55.3	55.4	54.1	60.5	55.1	56.1	51.5	53.5	52.4
	pH (lab)	pH	6.5 - 9.0	-	7.82	7.75	7.74	7.58	7.71	7.73	7.74	7.70	7.69	7.68	7.74	7.64	7.80	7.73
	Hardness (as $CaCO_3$)	mg/L	-	-	31	27	29	25	26	26	25	25	27	25	25	24	24	24
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	41	35	44	34	40	37	32	33	40	29	37	37	49	37
	Turbidity	NTU	-	-	2.09	2.01	1.30	1.55	1.32	1.22	0.94	0.97	1.33	2.07	1.12	1.76	1.86	1.78
	Alkalinity (as $CaCO_3$)	mg/L	-	-	29	22	25	23	18	24	23	26	28	24	24	22	20	25
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	0.033	<0.020	<0.020	0.034	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.044	0.021
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	<0.020	0.024	<0.020	<0.020	0.023	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.1	1.7	1.8	1.9	1.8	1.7	1.9	1.8	1.1	1.1	1.0	1.9	1.2	1.8
	Total Organic Carbon	mg/L	-	-	2.4	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.9	1.5	1.4	1.5	1.2	1.2
	Total Phosphorus	mg/L	0.020[α]	-	0.0060	0.0055	0.0045	0.0056	0.0257	0.0082	0.0079	0.0044	0.0064	0.0059	0.0118	0.0068	0.0056	0.0055
	Phenols	mg/L	0.004[α]	-	0.0015	0.0017	0.0020	0.0026	0.0050	0.0032	0.0012	0.0016	0.0013	0.0013	0.0062	0.0018	0.0014	0.0016
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.35	1.18	1.26	1.20	1.19	1.19	1.11	1.35	1.24	1.19	1.22	1.26	1.25	1.19
	Sulphate (SO_4)	mg/L	218[β]	218	0.95	0.66	0.79	0.64	0.67	0.65	0.50	0.58	0.75	0.66	0.67	0.60	0.67	0.63
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	0.0482	0.0531	0.0369	0.0468	0.0390	0.0521	0.0123	***0.149***	0.0388	0.0533	0.0413	0.0417	0.0419	0.0387
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00444	0.00379	0.00401	0.00366	0.00356	0.00377	0.00306	0.00348	0.00374	0.00397	0.00345	0.00350	0.00327	0.00362
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	6.48	5.47	6.01	5.24	5.31	5.40	5.34	5.45	5.73	5.23	5.40	4.97	4.98	5.00
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00067	0.00069	0.00063	0.00058	0.00052	0.00061	<0.00050	0.00097	0.00057	0.00054	0.00052	0.00051	0.00051	0.00053
	Iron (Fe)	mg/L	0.30	0.326	0.044	0.046	0.037	0.046	0.041	0.043	<0.030	<0.030	0.038	0.058	0.040	0.044	0.042	0.043
	Lead (Pb)	mg/L	0.001	0.001	0.000066	0.000060	0.000052	0.000067	0.000052	0.000054	<0.000050	0.000070	0.000051	0.000077	0.000051	0.000060	0.000054	0.000065
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	3.81	3.09	3.42	2.90	3.03	3.02	3.08	2.99	3.25	3.09	3.05	2.87	2.88	2.90
	Manganese (Mn)	mg/L	0.935[β]	-	0.00230	0.00277	0.00222	0.00266	0.00228	0.00239	0.00195	0.00283	0.00224	0.00308	0.00214	0.00306	0.00258	0.00267
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000123	0.000096	0.000113	0.000081	0.000094	0.000093	0.000077	0.000086	0.000098	0.000082	0.000093	0.000079	0.000090	0.000081
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00067	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.60	0.49	0.53	0.45	0.48	0.47	0.44	0.44	0.50	0.49	0.47	0.45	0.46	0.46
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.51	0.44	0.45	0.45	0.44	0.42	0.33	0.38	0.47	0.47	0.43	0.44	0.40	0.40
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.954	0.800	0.861	0.747	0.778	0.776	0.728	0.763	0.810	0.786	0.770	0.764	0.747	0.753
	Strontium (Sr)	mg/L	-	-	0.00565	0.00462	0.00497	0.00427	0.00439	0.00428	0.00401	0.00413	0.00475	0.00427	0.00440	0.00402	0.00409	0.00398
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000557	0.000368	0.000444	0.000313	0.000341	0.000337	0.000270	0.000284	0.000390	0.000330	0.000338	0.000285	0.000292	0.000287
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intinsik (2013) using baseline water quality data specific to Mary Lake.

(grey box) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.59: Water chemistry at Mary Lake south basin (BLO) water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event													
					BL0-05-A-S surface 23-Aug-2016	BL0-05-A-B bottom 23-Aug-2016	BL0-05-S surface 23-Aug-2016	BL0-05-B bottom 23-Aug-2016	BL0-05-B-S surface 23-Aug-2016	BL0-05-B-B bottom 23-Aug-2016	BL0-03-S surface 24-Aug-2016	BL0-03-B bottom 24-Aug-2016	BL0-04 surface 23-Aug-2016	BL0-04-B bottom 23-Aug-2016	BL0-09-S surface 23-Aug-2016	BL0-09-B bottom 23-Aug-2016	BL0-06-S surface 23-Aug-2016	BL0-06-B bottom 23-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	-	84.0	87.2	79.6	56.4	81.7	78.3	76.4	64.1	76	82.7	75.8	54.8	77.1	76.7
	pH (lab)	pH	6.5 - 9.0	-	7.79	7.85	7.85	7.68	7.65	7.77	7.83	7.72	7.87	7.84	7.84	7.60	7.83	7.82
	Hardness (as $CaCO_3$)	mg/L	-	-	39	41	37	26	37	37	36	30	35	37	35	26	36	36
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	2.5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	46	43	41	25	41	39	42	35	41	43	36	25	39	36
	Turbidity	NTU	-	-	1.69	1.80	1.55	1.67	1.71	1.88	0.79	0.52	1.65	3.12	1.41	1.23	1.70	2.27
	Alkalinity (as $CaCO_3$)	mg/L	-	-	38	38	33	24	39	37	32	34	33	37	35	21	33	35
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrate	mg/L	13	13	<0.020	<0.020	<0.020	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.021	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.2	1.2	1.3	<1.0	1.2	1.2	1.4	1.2	1.3	1.2	1.2	1.1	1.2	1.2
	Total Organic Carbon	mg/L	-	-	1.3	1.4	1.4	1.1	1.3	1.3	1.5	1.2	1.3	1.6	1.4	1.2	1.4	1.3
	Total Phosphorus	mg/L	0.020[α]	-	0.0062	0.0072	0.0067	0.0080	0.0155	0.0054	0.0063	0.0065	0.0066	0.0061	0.0092	0.0061	0.0049	0.0059
	Phenols	mg/L	0.004[α]	-	0.0030	0.0187	0.0036	0.0038	0.0089	0.0075	0.0045	0.0014	0.0034	0.0088	0.0165	0.0021	0.0134	0.0024
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.85	1.97	1.58	1.25	1.61	1.58	1.30	1.27	1.41	1.80	1.42	1.29	1.48	1.52
	Sulphate (SO_4)	mg/L	218[β]	218	1.29	1.37	1.12	0.68	1.12	1.12	0.94	0.74	1.01	1.37	0.96	0.66	1.08	1.14
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	0.0763	0.0801	0.0663	0.0496	0.0670	0.0621	0.0264	0.0200	0.0513	0.0599	0.0552	0.0440	0.0627	0.0560
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00571	0.00553	0.00499	0.00395	0.00525	0.00540	0.00416	0.00342	0.00463	0.00527	0.00448	0.00353	0.00473	0.00483
	Beryllium (Be)	mg/L	0.011[α]	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	8.17	8.31	7.58	5.37	7.70	7.56	7.29	6.07	7.2	7.79	7.27	5.25	7.34	7.18
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00067	0.00069	0.00075	0.00053	0.00065	0.00076	0.00056	<0.00050	0.00150	***0.0438****	***0.00398****	***0.0271****	***0.00284****	***0.0115****
	Iron (Fe)	mg/L	0.30	0.326	0.053	0.058	0.049	0.047	0.048	0.055	<0.030	<0.030	0.042	0.058	0.039	0.039	0.048	0.055
	Lead (Pb)	mg/L	0.001	0.001	0.000068	0.000066	0.000053	0.000067	0.000057	0.000067	<0.000050	<0.000050	0.000051	0.000084	<0.000050	0.000061	0.000060	0.000075
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	4.73	4.89	4.52	3.17	4.49	4.40	4.26	3.64	4.33	4.51	4.30	3.08	4.31	4.35
	Manganese (Mn)	mg/L	0.935[β]	-	0.00158	0.00157	0.00126	0.00445	0.00125	0.00155	0.00105	0.00125	0.00113	0.00213	0.00110	0.00167	0.00129	0.00180
	Mercury (Hg)	mg/L	0.000026	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	-	0.000164	0.000165	0.000137	0.000093	0.000137	0.000141	0.000104	0.000083	0.000137	0.000148	0.000131	0.000087	0.000141	0.000126
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.67	0.68	0.64	0.50	0.63	0.63	0.53	0.49	0.60	0.66	0.59	0.49	0.61	0.62
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.67	0.68	0.62	0.52	0.64	0.63	0.61	0.47	0.60	0.65	0.57	0.48	0.61	0.62
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.21	1.27	1.11	0.819	1.09	1.13	0.927	0.844	1.02	1.17	0.999	0.806	1.03	1.07
	Strontium (Sr)	mg/L	-	-	0.00697	0.00721	0.00644	0.00442	0.00640	0.00632	0.00545	0.00456	0.0059	0.00676	0.00587	0.00436	0.00612	0.00609
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000815	0.000882	0.000695	0.000305	0.000699	0.000674	0.000505	0.000357	0.000579	0.000783	0.000570	0.000315	0.000608	0.000657
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intinsik (2013) using baseline water quality data specific to Mary Lake.

(shaded) Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Table C.60: Dissolved metal concentrations at Mary Lake north basin water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Winter Sampling Event					Spring Sampling	Summer Sampling Event							Fall Sampling Event						
			BL0-01-A (S) surface 25-Apr-2016	BL0-01-A (B) bottom 25-Apr-2016	BL0-01 (S) surface 1-May-2016	BL0-01 (B) bottom 1-May-2016	BL0-01-B surface 25-Apr-2016	I0-01 river 25-Jun-2016	I0-01 river 20-Jul-2016	BL0-01-A-S surface 26-Jul-2016	BL0-01-A-B bottom 26-Jul-2016	BL0-01-S surface 26-Jul-2016	BL0-01-B bottom 26-Jul-2016	BL0-01-B-S surface 26-Jul-2016	BL0-01-B-B bottom 26-Jul-2016	I0-01 river 19-Aug-2016	BL0-01A-S surface 21-Aug-2016	BL0-01A-B bottom 21-Aug-2016	BL0-01-S surface 21-Aug-2016	BL0-01-B bottom 21-Aug-2016	BL0-01B-S surface 21-Aug-2016	BL0-01B-B bottom 21-Aug-2016
Dissolved Metals	Aluminum (Al)	mg/L	<0.0030	<0.0030	0.00218	0.00208	<0.0030	0.0075	0.0068	0.0045	0.0054	0.0055	0.0053	0.0046	0.00505	0.0035	0.0048	0.0047	0.0045	0.0047	0.0052	0.0055
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	0.000080	0.000071	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.0103	0.00947	0.0119	0.0109	0.0105	0.00166	0.00459	0.00454	0.00495	0.00434	0.00473	0.00462	0.00495	0.00976	0.00785	0.00809	0.00801	0.00824	0.00833	0.00803
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.000010	<0.000010	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	22.2	21.7	23.1	21.9	22.7	2.54	8.66	8.73	9.42	8.39	8.88	8.99	9.1	19.7	15.4	16.9	15.4	16.3	15.6	14.7
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	0.0000156	0.0000129	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00122	0.00081	0.00118	0.00079	0.00116	0.00043	<0.00050	0.00056	0.00055	0.00053	0.00057	0.00057	0.00056	0.00097	0.00090	0.00091	0.00102	0.00100	0.00090	0.00097
	Iron (Fe)	mg/L	<0.030	<0.030	0.0083	0.0067	<0.030	<0.010	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.0000090	<0.0000090	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0012	<0.0010	0.00108	0.00103	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0013	0.0011	0.0011	0.0011	<0.0010
	Magnesium (Mg)	mg/L	13.2	12.8	14.1	13.3	13.6	1.55	5.08	5.26	5.49	4.99	5.28	5.34	5.40	11.2	9.13	9.50	9.13	9.30	9.16	8.78
	Manganese (Mn)	mg/L	0.000765	0.000630	0.00114	0.00119	0.00143	0.00092	0.000201	0.00120	0.00109	0.00110	0.00112	0.00112	0.00114	0.000394	0.00223	0.00300	0.00228	0.00255	0.00254	0.00233
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000395	0.000254	0.000314	0.000306	0.000345	<0.000050	0.000090	0.000101	0.000094	0.000099	0.000100	0.000100	0.000102	0.000241	0.000195	0.000215	0.000200	0.000202	0.000202	0.000201
	Nickel (Ni)	mg/L	0.00125	0.00110	0.000716	0.000604	0.00106	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	1.23	1.14	1.30	1.22	1.28	0.24	0.51	0.58	0.56	0.56	0.57	0.57	0.57	1.04	0.90	0.92	0.89	0.91	0.90	0.88
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.000040	<0.000040	<0.0010	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	1.03	1.79	1.12	1.10	1.10	0.233	0.62	0.55	0.59	0.52	0.57	0.56	0.57	0.86	0.85	0.86	0.86	0.85	0.87	0.83
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	3.23	3.06	3.41	3.18	3.26	<0.50	0.921	0.963	0.939	0.930	0.952	0.960	0.97	3.02	2.16	2.27	2.07	2.24	2.09	2.09
	Strontium (Sr)	mg/L	0.0150	0.0142	0.0155	0.0148	0.0155	0.0017	0.00552	0.00577	0.00627	0.00573	0.00601	0.00597	0.0060	0.0130	0.0108	0.0117	0.0109	0.0112	0.0109	0.0104
	Thallium (Tl)	mg/L	<0.00010	<0.00010	0.0000038	0.0000034	<0.00010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	0.00012	<0.00010	<0.000030	<0.000030	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.00050	<0.00050	<0.010	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.00267	0.00192	0.00268	0.00258	0.00265	0.000056	0.000499	0.000500	0.000623	0.000433	0.000512	0.000543	0.000553	0.00245	0.00157	0.00176	0.00156	0.00169	0.00153	0.00154
	Vanadium (V)	mg/L	<0.0010	<0.0010	0.000095	0.000086	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	<0.0030	0.00112	0.00198	<0.0030	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0033	<0.0030

Table C.61: Dissolved metal concentrations at Mary Lake south basin water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Winter Sampling Event														Summer Sampling Event						
			BL0-05-A-S	BL0-05-A-B	BL0-05-S	BL0-05-B	BL0-05-B-S	BL0-05-B-B	BL0-03-S	BL0-03-B	BL0-04-S	BL0-04-B	BL0-09-S	BL0-09-B	BL0-06-S	BL0-06-B	BL0-05-A-S	BL0-05-A-B	BL0-05-S	BL0-05-B	BL0-05-B-S	BL0-05-B-B	BL0-03-S
			surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
			1-May-2016	1-May-2016	1-May-2016	1-May-2016	1-May-2016	1-May-2016	6-May-2016	6-May-2016	6-May-2016	6-May-2016	6-May-2016	6-May-2016	6-May-2016	6-May-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016
Dissolved Metals	Aluminum (Al)	mg/L	0.00243	0.00197	0.00216	0.00230	0.00276	0.00241	<0.0030	<0.0030	0.0119	<0.0030	<0.0030	0.0033	<0.0030	0.0032	0.0081	0.0070	0.0086	0.0064	0.0066	0.0064	0.0051
	Antimony (Sb)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.000045	0.000039	0.000043	0.000047	0.000051	0.000045	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00493	0.00452	0.00509	0.00499	0.00552	0.00541	0.00494	0.00412	0.00543	0.00450	0.00495	0.00476	0.00510	0.00498	0.00408	0.00371	0.00372	0.00341	0.00322	0.00350	0.00294
	Beryllium (Be)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010	<0.000010	0.000014	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	8.77	8.34	9.05	8.11	9.56	9.36	9.30	8.00	10.2	8.18	8.99	8.5	9.19	8.88	6.30	5.64	5.95	5.17	5.31	5.27	5.27
	Chromium (Cr)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.0000050	0.0000055	0.0000065	0.0000085	0.0000072	0.0000064	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00064	0.00068	0.00067	0.00084	0.00066	0.00075	0.00087	0.00054	0.00202	0.00065	0.00067	0.00071	0.00069	0.00066	0.00058	0.00053	0.00060	<0.00050	0.00051	<0.00050	<0.00050
	Iron (Fe)	mg/L	0.0028	0.0022	0.0025	0.0029	0.0038	0.0038	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.0000090	<0.0000090	<0.0000090	0.0000135	<0.0000090	0.0000090	<0.000050	<0.000050	0.000063	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00061	0.00059	0.00057	<0.00050	0.00056	0.00058	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	5.29	4.92	5.29	4.80	5.65	5.47	5.23	4.73	5.24	4.75	5.28	4.96	5.47	5.13	3.71	3.08	3.41	2.90	3.01	3.00	2.99
	Manganese (Mn)	mg/L	0.000216	0.000169	0.000207	0.000364	0.000294	0.000481	0.000355	0.000187	0.00125	0.000190	0.000189	0.00022	0.000247	0.000214	0.000478	0.000551	0.000480	0.000809	0.000524	0.000489	0.000333
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000173	0.000167	0.000163	0.000151	0.000188	0.000179	0.000154	0.000137	0.000195	0.000145	0.000159	0.000151	0.000175	0.000160	0.000147	0.000114	0.000123	0.000094	0.000106	0.000097	0.000081
	Nickel (Ni)	mg/L	0.000372	0.000382	0.000397	0.000368	0.000424	0.000591	<0.00050	<0.00050	0.00067	<0.00050	<0.00050	0.00056	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.691	0.623	0.680	0.608	0.731	0.702	0.69	0.61	0.76	0.63	0.69	0.65	0.72	0.67	0.56	0.47	0.52	0.44	0.46	0.44	0.42
	Selenium (Se)	mg/L	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.360	0.345	0.344	0.383	0.394	0.373	0.37	0.35	0.36	0.34	0.36	0.49	0.37	0.35	0.44	0.36	0.40	0.36	0.36	0.36	0.31
	Silver (Ag)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.25	1.14	1.26	1.15	1.34	1.29	1.24	1.09	1.47	1.13	1.23	1.20	1.27	1.21	0.949	0.802	0.886	0.758	0.775	0.766	0.710
	Strontium (Sr)	mg/L	0.00698	0.00653	0.00718	0.00641	0.00758	0.00718	0.00706	0.00618	0.00784	0.00644	0.00706	0.0066	0.00732	0.00699	0.00552	0.00447	0.00495	0.00424	0.00433	0.00432	0.00388
	Thallium (Tl)	mg/L	0.0000023	<0.0000020	0.0000023	<0.0000020	0.0000021	0.0000024	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.000030	<0.000030	<0.000030	<0.000030	<0.000030	<0.000030	<0.00010	<0.00010	0.00035	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000731	0.000699	0.000743	0.000612	0.000768	0.000742	0.000647	0.000612	0.000677	0.000610	0.000707	0.000607	0.000716	0.000690	0.000541	0.000359	0.000428	0.000287	0.000321	0.000315	0.000273
	Vanadium (V)	mg/L	0.000080	0.000074	0.000062	0.000064	0.000088	0.000077	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.00055	0.00064	0.00098	0.00091	0.00101	0.00095	<0.0030	<0.0030	0.0081	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.61: Dissolved metal concentrations at Mary Lake south basin water quality monitoring stations, Mary River Project CREMP, 2016.

	Parameters	Units	Summer Sampling Event							Fall Sampling Event															
			BL0-03-B	BL0-04-S	BL0-04-B	BL0-09-S	BL0-09-B	BL0-06-S	BL0-06-B	BL0-05-A-S	BL0-05-A-B	BL0-05-S	BL0-05-B	BL0-05-B-S	BL0-05-B-B	BL0-03-S	BL0-03-B	BL0-04	BL0-04-B	BL0-09-S	BL0-09-B	BL0-06-S	BL0-06-B
			bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom
			30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	30-Jul-2016	29-Jul-2016	29-Jul-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016	24-Aug-2016	24-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016	23-Aug-2016
Dissolved Metals	Aluminum (Al)	mg/L	0.0056	0.0083	0.0084	0.0081	0.0065	0.0062	0.0057	0.0763	0.0801	0.0663	0.0496	0.0670	0.0621	0.0264	0.0200	0.0513	0.0599	0.0552	0.0440	0.0627	0.0560
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00322	0.00341	0.00376	0.00323	0.00313	0.00329	0.00337	0.00571	0.00553	0.00499	0.00395	0.00525	0.00540	0.00416	0.00342	0.00463	0.00527	0.00448	0.00353	0.00473	0.00483
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	5.11	5.53	5.21	5.12	4.94	4.98	5.01	8.17	8.31	7.58	5.37	7.70	7.56	7.29	6.07	7.2	7.79	7.27	5.25	7.34	7.18
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	<0.00050	<0.00050	0.00084	<0.00050	<0.00050	<0.00050	<0.00050	0.00067	0.00069	0.00075	0.00053	0.00065	0.00076	0.00056	<0.00050	0.00150	0.0438	0.00398	0.0271	0.00284	0.0115
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.053	0.058	0.049	0.047	0.048	0.055	<0.030	<0.030	0.042	0.058	0.039	0.039	0.048	0.055
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000068	0.000066	0.000053	0.000067	0.000057	0.000067	<0.000050	<0.000050	0.000051	0.000084	<0.000050	0.000061	0.000060	0.000075
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	2.94	3.20	2.88	3.00	2.82	2.83	2.81	4.73	4.89	4.52	3.17	4.49	4.40	4.26	3.64	4.33	4.51	4.30	3.08	4.31	4.35
	Manganese (Mn)	mg/L	0.000507	0.000420	0.00117	0.000480	0.000938	0.000738	0.000743	0.00158	0.00157	0.00126	0.00445	0.00125	0.00155	0.00105	0.00125	0.00113	0.00213	0.00110	0.00167	0.00129	0.00180
	Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.000078	0.000091	0.000103	0.000100	0.000080	0.000087	0.000087	0.000164	0.000165	0.000137	0.000093	0.000137	0.000141	0.000104	0.000083	0.000137	0.000148	0.000131	0.000087	0.000141	0.000126
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.42	0.48	0.46	0.46	0.43	0.43	0.43	0.67	0.68	0.64	0.50	0.63	0.63	0.53	0.49	0.60	0.66	0.59	0.49	0.61	0.62
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.34	0.39	0.37	0.36	0.35	0.34	0.34	0.67	0.68	0.62	0.52	0.64	0.63	0.61	0.47	0.60	0.65	0.57	0.48	0.61	0.62
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.758	0.804	0.763	0.770	0.762	0.741	0.728	1.21	1.27	1.11	0.819	1.09	1.13	0.927	0.844	1.02	1.17	0.999	0.806	1.03	1.07
	Strontium (Sr)	mg/L	0.00382	0.00469	0.00424	0.00427	0.00400	0.00408	0.00398	0.00697	0.00721	0.00644	0.00442	0.00640	0.00632	0.00545	0.00456	0.0059	0.00676	0.00587	0.00436	0.00612	0.00609
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000271	0.000345	0.000294	0.000320	0.000257	0.000272	0.000272	0.000815	0.000882	0.000695	0.000305	0.000699	0.000674	0.000505	0.000357	0.000579	0.000783	0.000570	0.000315	0.000608	0.000657
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.0040	<0.0030	0.0053	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.62: Summary of the magnitude of difference in aqueous metal concentrations between Mary Lake and Reference Lake 3 in 2016, and at Mary Lake between 2016 and the baseline period for winter, summer, and fall sampling events, Mary River Project CREMP. No reference lake data were collected in winter 2016.

Variable	Mary Lake North Basin					Mary Lake South Basin				
	2016 vs Reference Lake 3		2016 vs Baseline			2016 vs Reference Lake 3		2016 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	1.2	1.9	0.9	0.9	1.0	0.7	0.9	0.9	0.8	0.9
Hardness (as $CaCO_3$)	1.2	2.2	0.9	0.8	0.9	0.7	1.0	1.0	0.8	0.9
Total Suspended Solids (TSS)	0.9	1.0	1.0	1.0	1.0	0.9	1.0	1.0	0.6	1.0
Total Dissolved Solids (TDS)	1.0	2.2	0.9	0.7	0.8	0.8	1.0	0.7	0.9	0.7
Turbidity	7.3	4.0	2.0	0.6	1.6	6.8	4.9	0.3	0.8	1.4
Alkalinity (as $CaCO_3$)	1.4	2.4	1.0	0.9	1.0	0.7	1.0	0.9	0.7	0.9
Total Ammonia	1.0	0.8	0.3	0.2	0.2	1.2	0.5	0.2	0.3	0.3
Nitrate	1.0	1.0	0.8	0.2	0.2	1.0	1.0	0.3	0.2	0.2
Nitrite	1.0	1.0	1.2	1.2	0.8	1.0	1.0	1.6	0.3	1.1
Total Kjeldahl Nitrogen (TKN)	0.8	1.0	0.7	0.5	0.6	0.8	1.0	1.1	0.9	0.9
Dissolved Organic Carbon	0.4	0.7	1.8	0.7	1.0	0.6	0.4	1.4	1.1	0.9
Total Organic Carbon	0.4	0.7	1.2	0.6	1.1	0.6	0.5	1.1	1.0	0.9
Total Phosphorus	0.9	0.4	0.5	0.6	0.5	1.5	0.7	1.0	1.4	1.2
Phenols	0.9	0.7	1.6	2.4	2.3	0.9	2.3	1.2	2.3	7.0
Bromide (Br)	1.0	1.0	0.5	0.5	0.7	1.0	1.0	0.9	0.4	0.4
Chloride (Cl)	0.9	2.6	0.7	0.7	0.8	0.9	1.2	0.6	0.5	0.5
Sulphate (SO_4)	0.1	0.3	0.5	0.3	0.3	0.2	0.3	0.6	0.3	0.4
Aluminum (Al)	8.4	6.4	0.6	0.5	0.3	12	13	0.4	0.7	1.7
Antimony (Sb)	1.0	1.2	1.0	1.0	1.2	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.9
Barium (Ba)	0.8	1.2	0.9	0.7	0.9	0.6	0.7	1.0	0.8	0.9
Beryllium (Be)	1.0	0.2	1.5	1.5	0.2	1.0	1.0	1.1	1.5	2.0
Bismuth (Bi)	1.0	0.1	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0
Boron (B)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cadmium (Cd)	1.0	1.0	0.8	0.9	0.7	1.0	1.0	0.2	0.9	0.8
Calcium (Ca)	1.3	2.2	0.9	0.8	0.9	0.8	1.0	0.9	0.8	0.9
Chromium (Cr)	1.0	1.0	1.6	0.9	0.7	1.0	1.0	1.2	1.1	1.1
Cobalt (Co)	1.0	1.0	1.0	0.8	0.7	1.0	1.0	1.0	0.9	0.9
Copper (Cu)	0.8	1.3	0.9	0.6	0.4	0.8	0.9	0.9	0.7	0.9
Iron (Fe)	1.1	1.7	1.4	0.3	0.5	1.4	1.6	1.0	0.6	1.0
Lead (Pb)	1.0	2.0	0.9	0.7	1.4	1.2	1.2	0.9	0.7	1.1
Lithium (Li)	1.0	1.0	0.4	0.3	0.2	1.0	1.0	0.2	0.3	0.4
Magnesium (Mg)	1.3	2.0	0.9	0.9	0.9	0.7	1.0	1.0	0.8	1.0
Manganese (Mn)	3.5	8.1	1.2	0.7	0.5	3.4	2.7	0.5	1.2	1.4
Mercury (Hg)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0
Molybdenum (Mo)	0.8	1.6	1.0	0.7	0.9	0.7	0.9	1.1	0.9	0.9
Nickel (Ni)	1.0	1.1	1.5	0.9	0.9	1.0	1.0	1.0	1.0	1.0
Potassium (K)	0.7	1.0	1.0	1.0	1.1	0.5	0.7	1.0	1.0	1.2
Selenium (Se)	1.0	0.1	2.8	2.4	0.1	1.0	1.0	1.2	1.4	1.9
Silicon (Si)	1.4	1.9	1.0	0.9	0.9	1.0	1.4	0.8	0.8	1.3
Silver (Ag)	1.0	5.0	1.6	1.8		1.0	1.0	1.2	1.9	2.3
Sodium (Na)	1.1	2.4	0.7	1.1	0.9	0.9	1.2	0.9	1.0	1.0
Strontium (Sr)	0.7	1.4	0.9	0.8	0.9	0.6	0.7	0.7	0.7	0.8
Thallium (Tl)	1.0	0.1	1.6	1.5	0.1	1.0	1.0	1.1	1.5	2.1
Tin (Sn)	1.0	1.0	0.1	0.0	0.0	1.0	1.0	0.2	0.1	0.1
Titanium (Ti)	1.0	0.1	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0
Uranium (U)	2.2	5.8	0.8	0.7	0.7	1.4	2.2	0.9	0.7	0.9
Vanadium (V)	1.0	0.5	1.0	1.0	0.3	1.0	1.0	1.0	1.0	1.0
Zinc (Zn)	1.0	1.0	1.6	1.6	3.0	1.0	1.0	1.7	1.4	1.4

Denotes slight elevation (mean variable concentration 3 to 5 times higher than respective mean reference ot baseline period value).

Denotes moderate elevation (mean variable concentration 5 to 10 times higher than respective mean reference or baseline period value).

Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference or baseline period value).

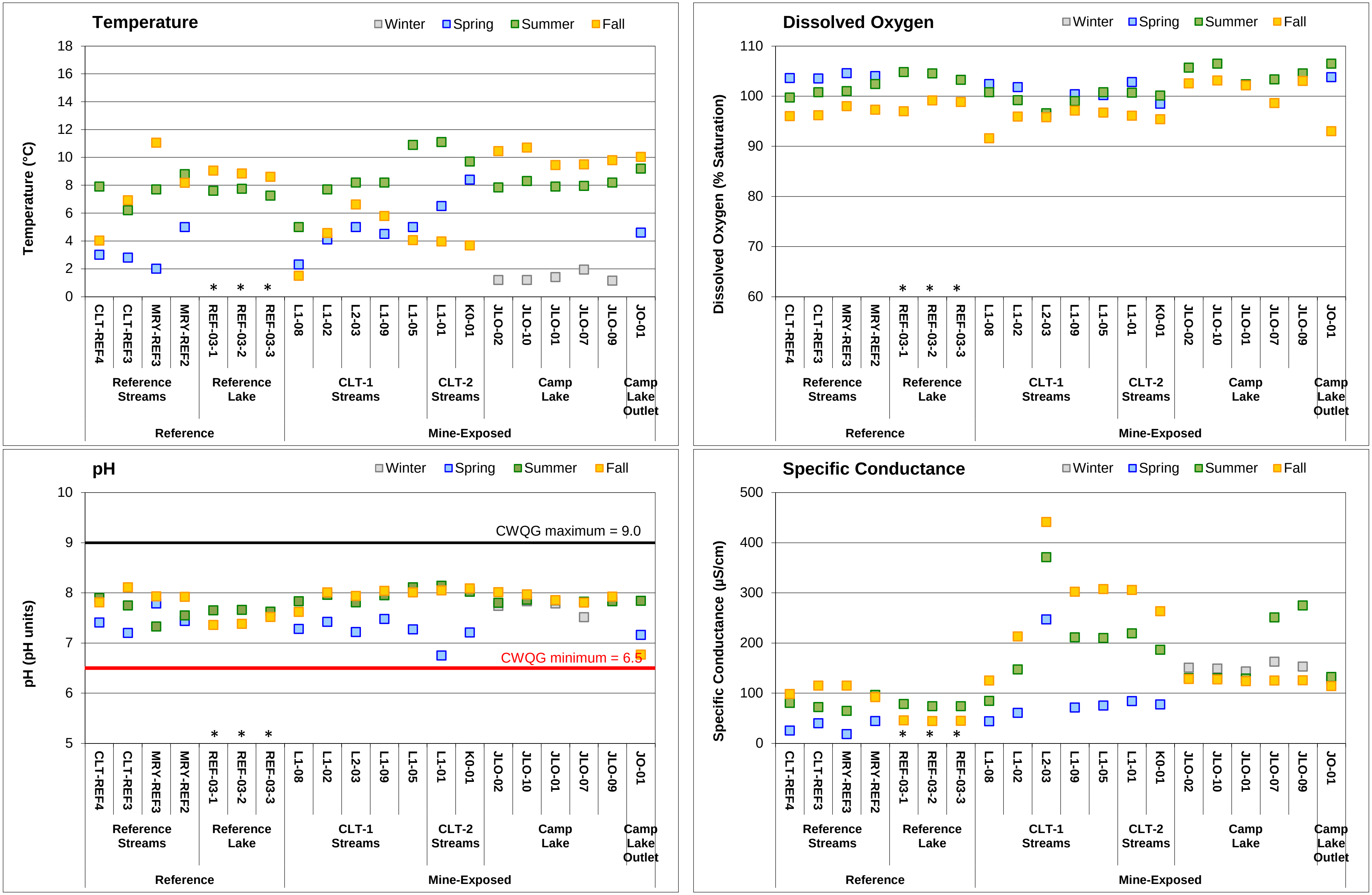


Figure C.1: Comparison of *in-situ* water quality variables measured at Camp Lake system water quality monitoring stations in winter, spring, summer, and fall 2016, Mary River Project CREMP. Lake values represent mean of surface and bottom *in-situ* water quality measurements. * Reference Lake 3 (REF-03) was not sampled in winter.

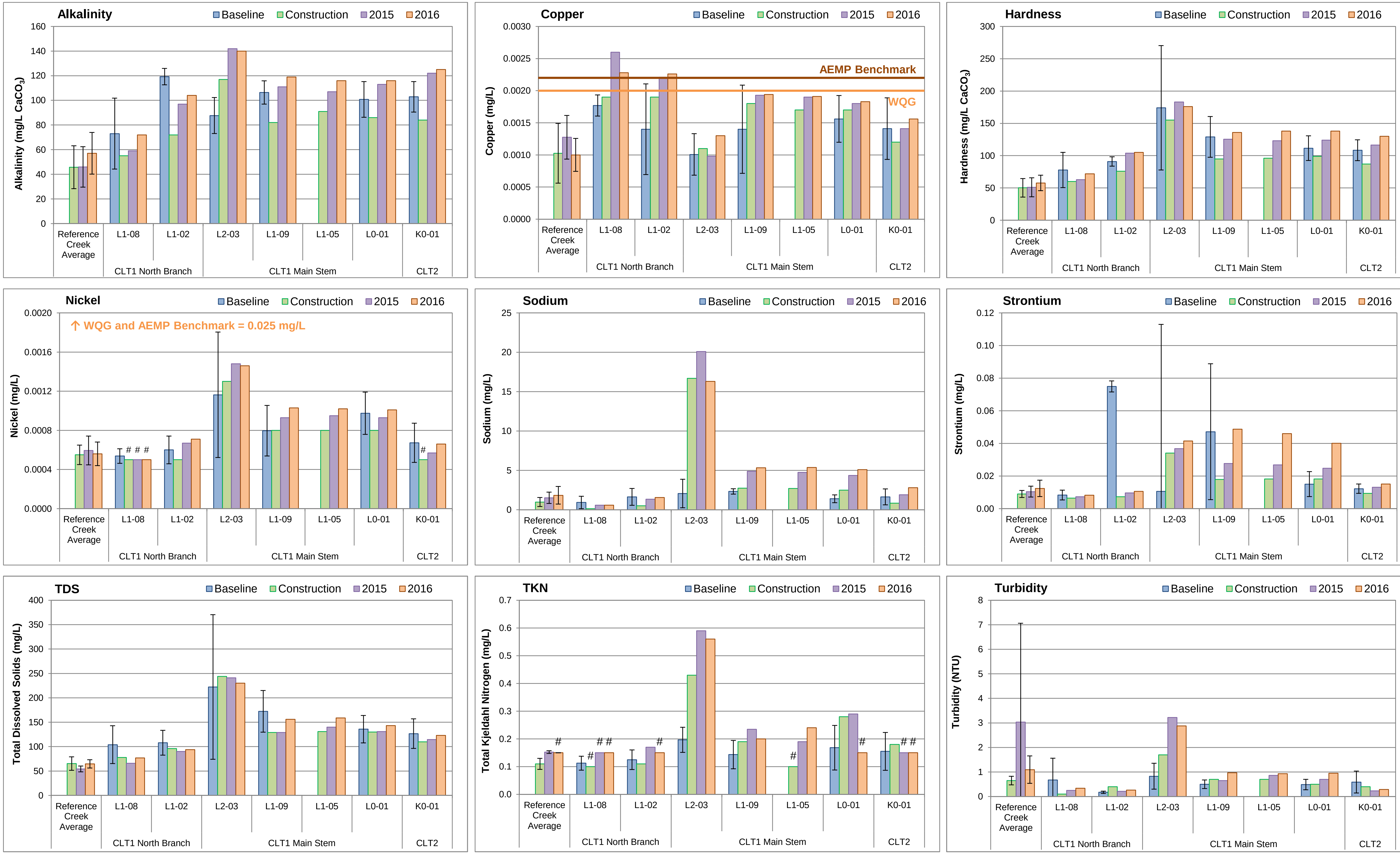


Figure C.2: Temporal comparison of water chemistry at Camp Lake Tributary 1 (CLT-1) and Tributary 2 (CLT-2) for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods in the fall. Values represent mean ± SD. Creek reference includes the CLT-REF and MRY-REF series stations (mean ± SD; n = 4). Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.2 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to the Camp Lake Tributaries.

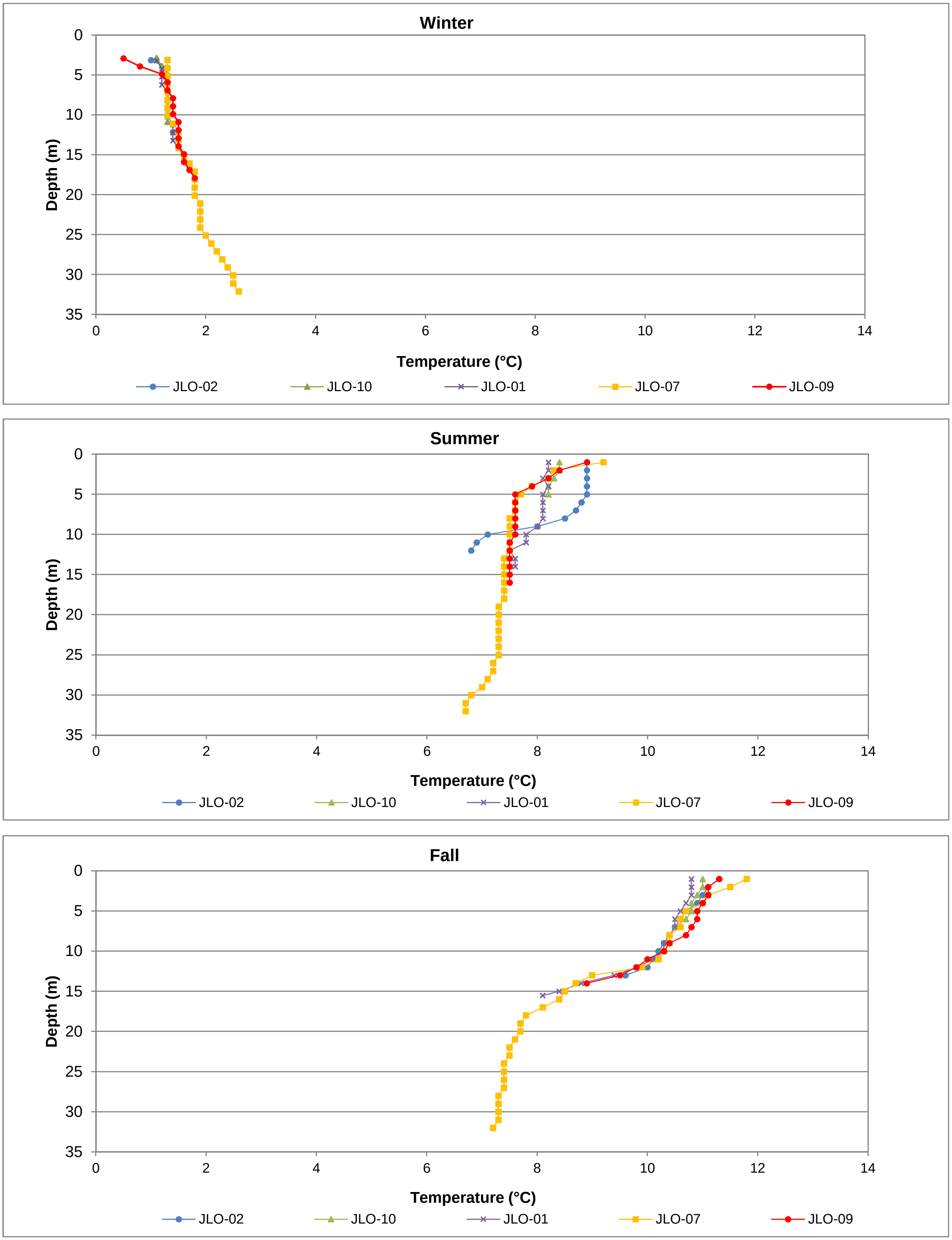


Figure C.3: Vertical profiles of temperature measured at Camp Lake in winter, summer and fall, 2016.

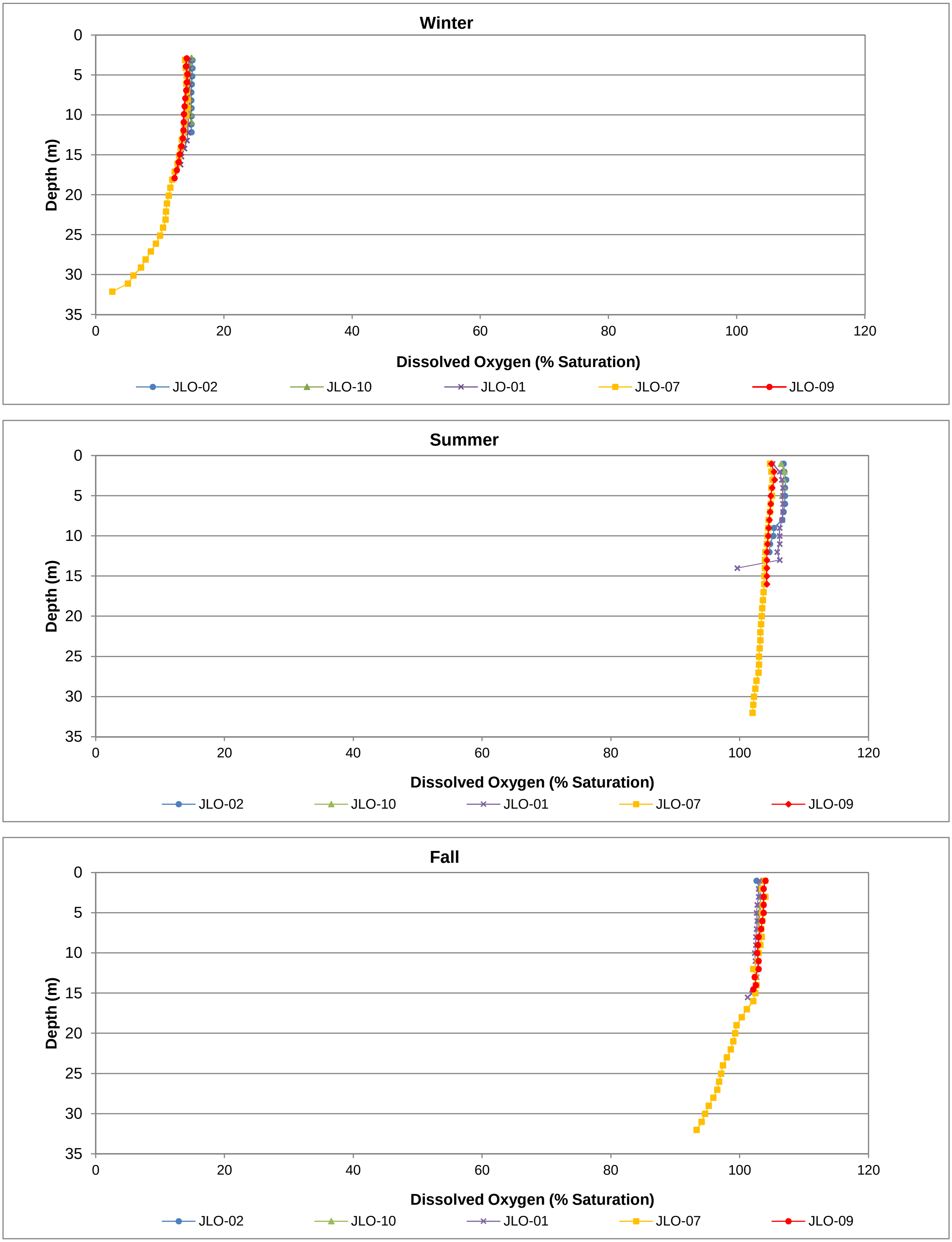


Figure C.4: Vertical profiles of dissolved oxygen measured at Camp Lake in winter, summer, and fall, 2016.

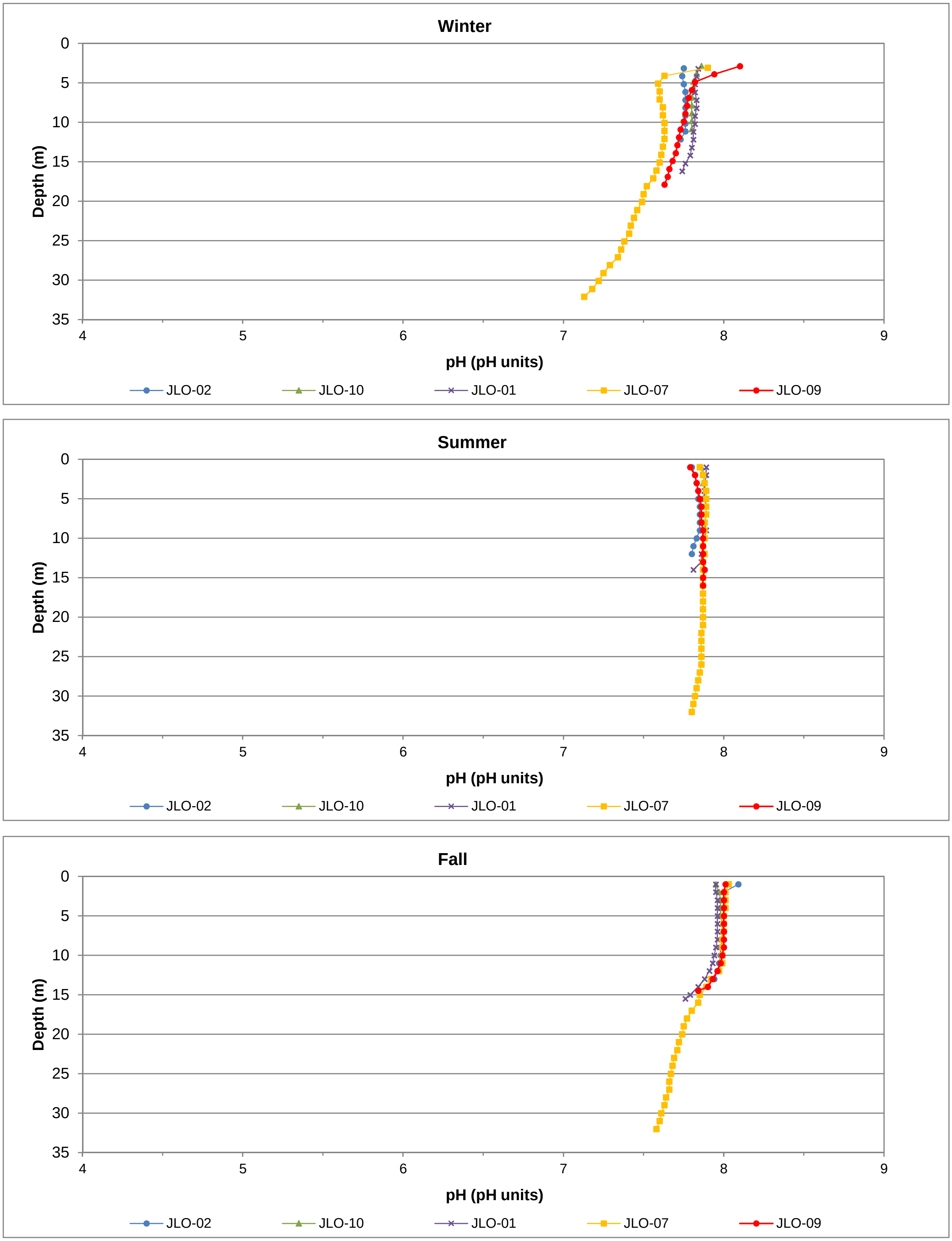


Figure C.5: Vertical profiles of pH measured at Camp Lake in winter, summer and fall, 2016.

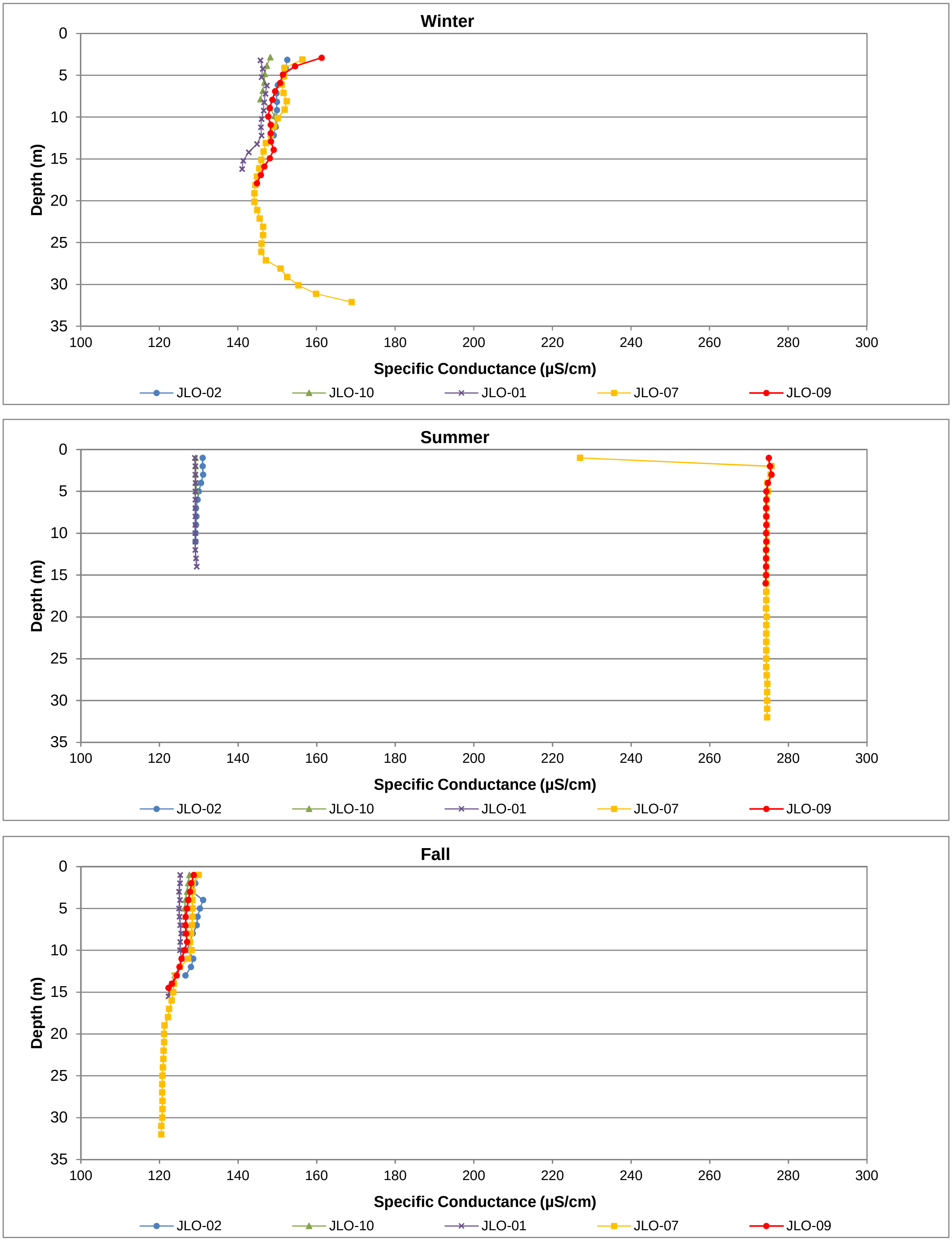


Figure C.6: Vertical profiles of conductivity measured at Camp Lake in winter, summer, and fall, 2016.

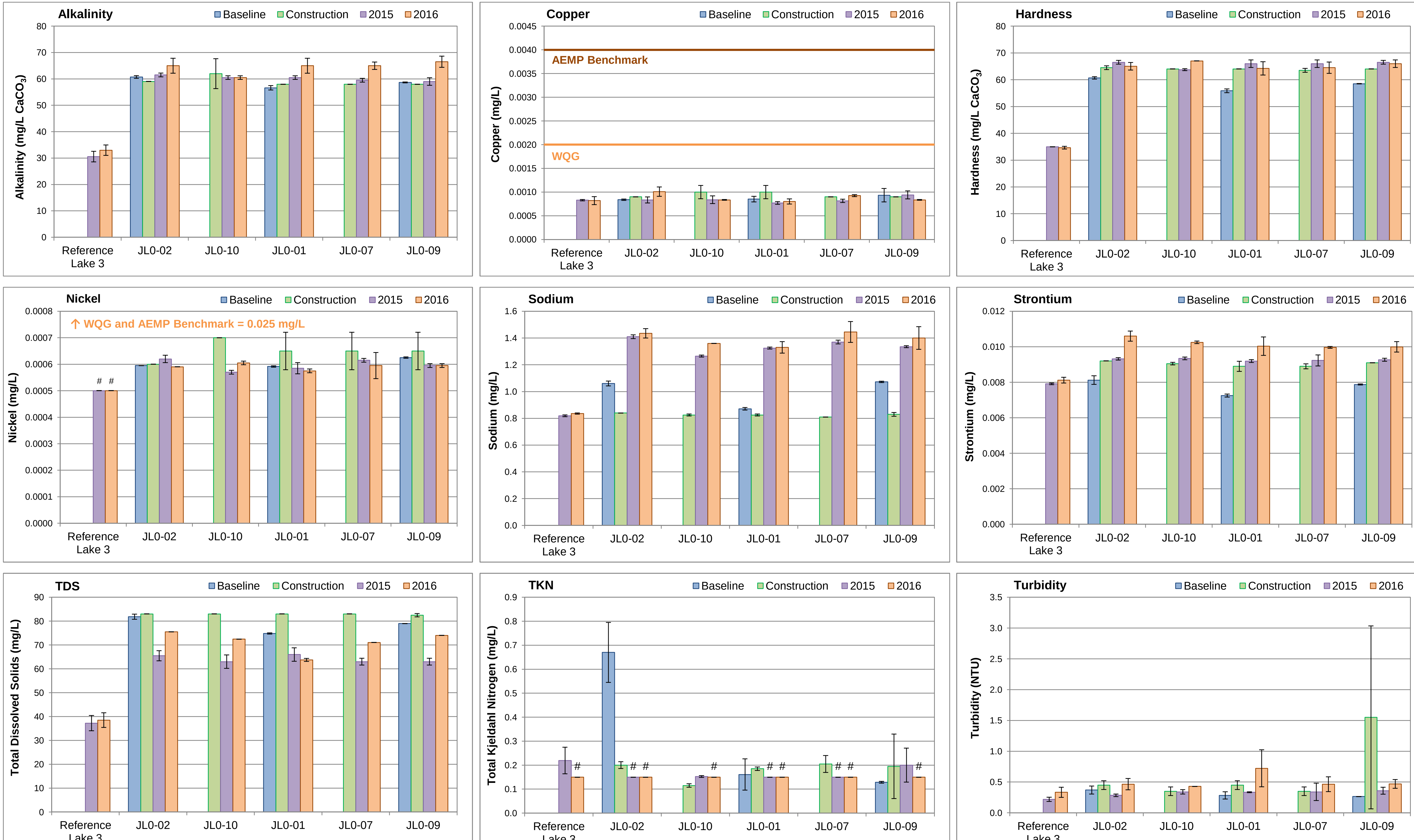


Figure C.7: Temporal comparison of water chemistry at Camp Lake (JLO) for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during fall. Values represent mean ± SD. Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.2 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to Camp Lake.

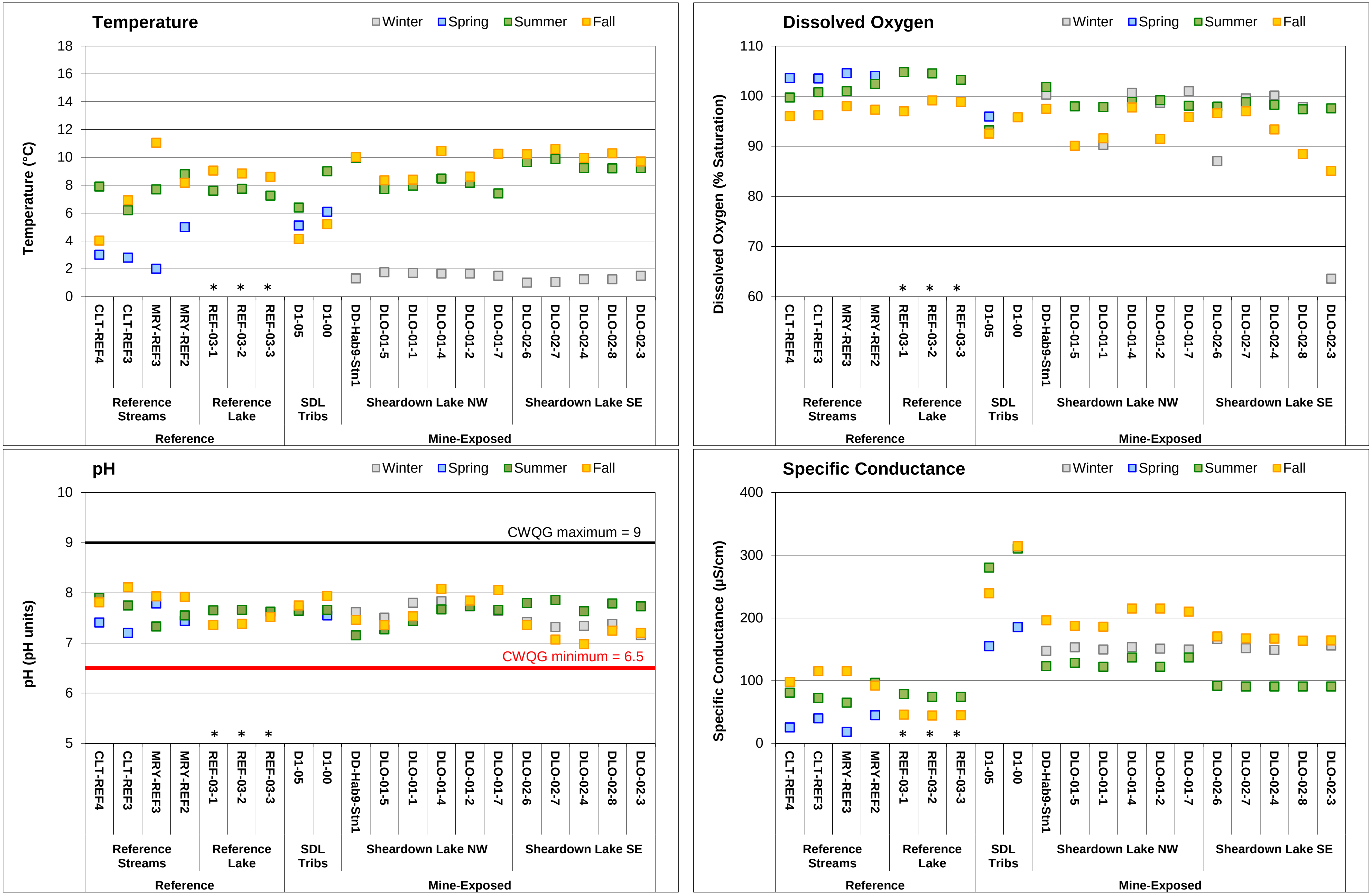


Figure C.8: Comparison of *in-situ* water quality variables measured at Sheardown Lake system water quality monitoring stations in winter, spring, summer, and fall 2016, Mary River Project CREMP. Lake values represent mean of surface and bottom *in-situ* water quality measurements. * Reference Lake 3 (REF-03) was not sampled in winter.

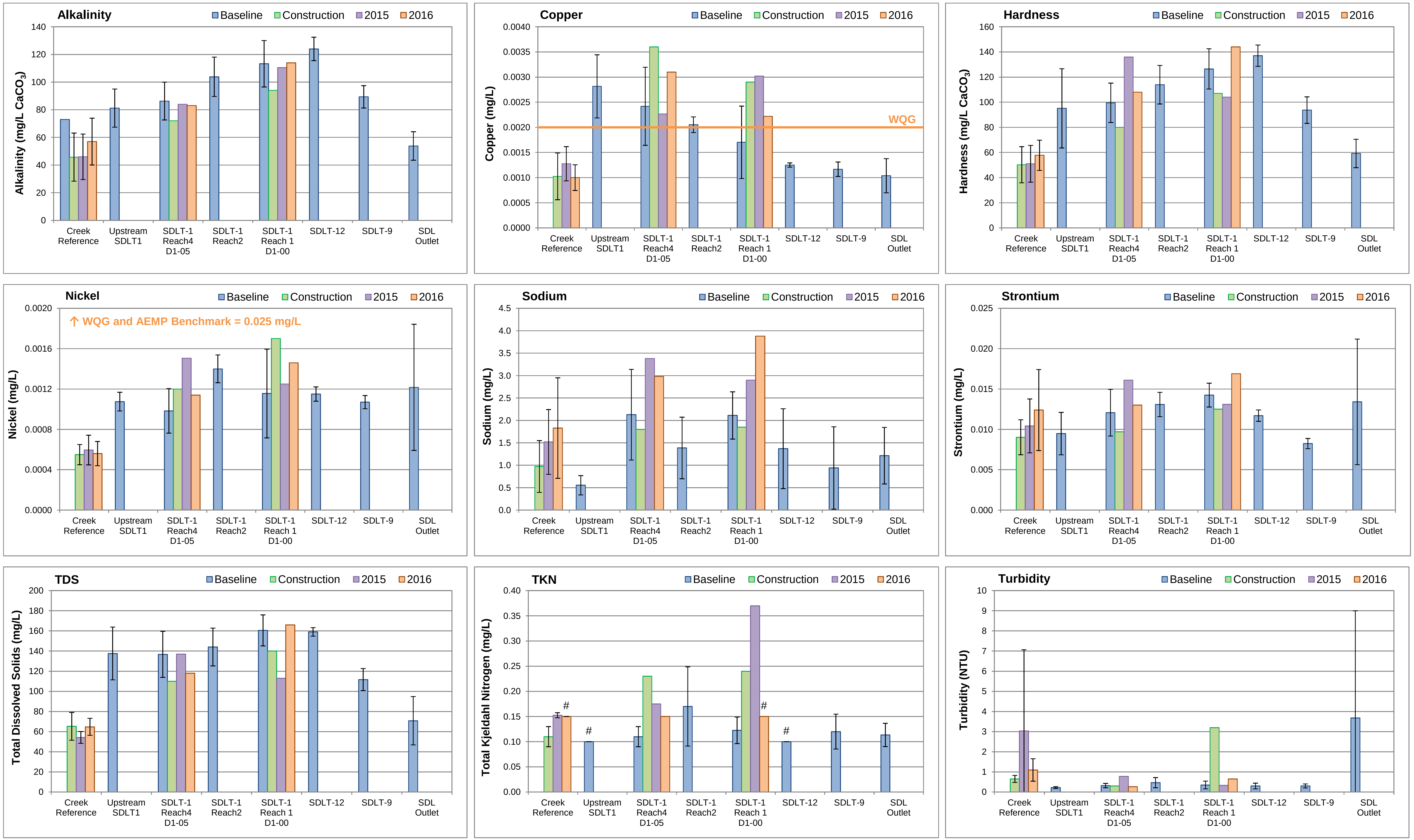


Figure C.9: Temporal comparison of water chemistry at Sheardown Lake Tributaries (SDLT) for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods during fall. Values represent mean ± SD. Creek reference includes the CLT-REF and MRY-REF series stations (mean ± SD; n = 4). Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.2 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to the Sheardown Lake Tributaries.

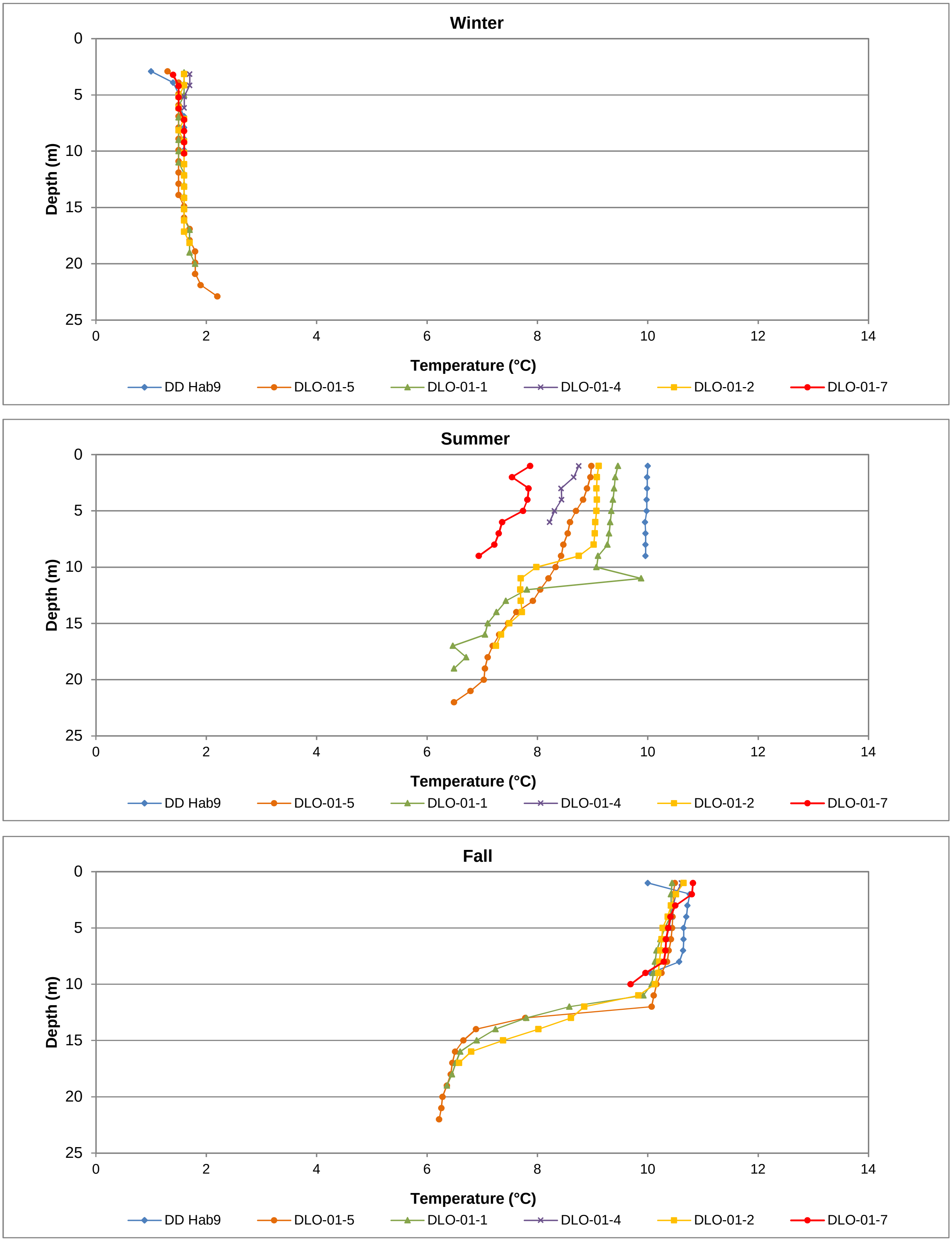


Figure C.10: Vertical profiles of temperature measured at Sheardown Lake NW in winter, summer, and fall, 2016.

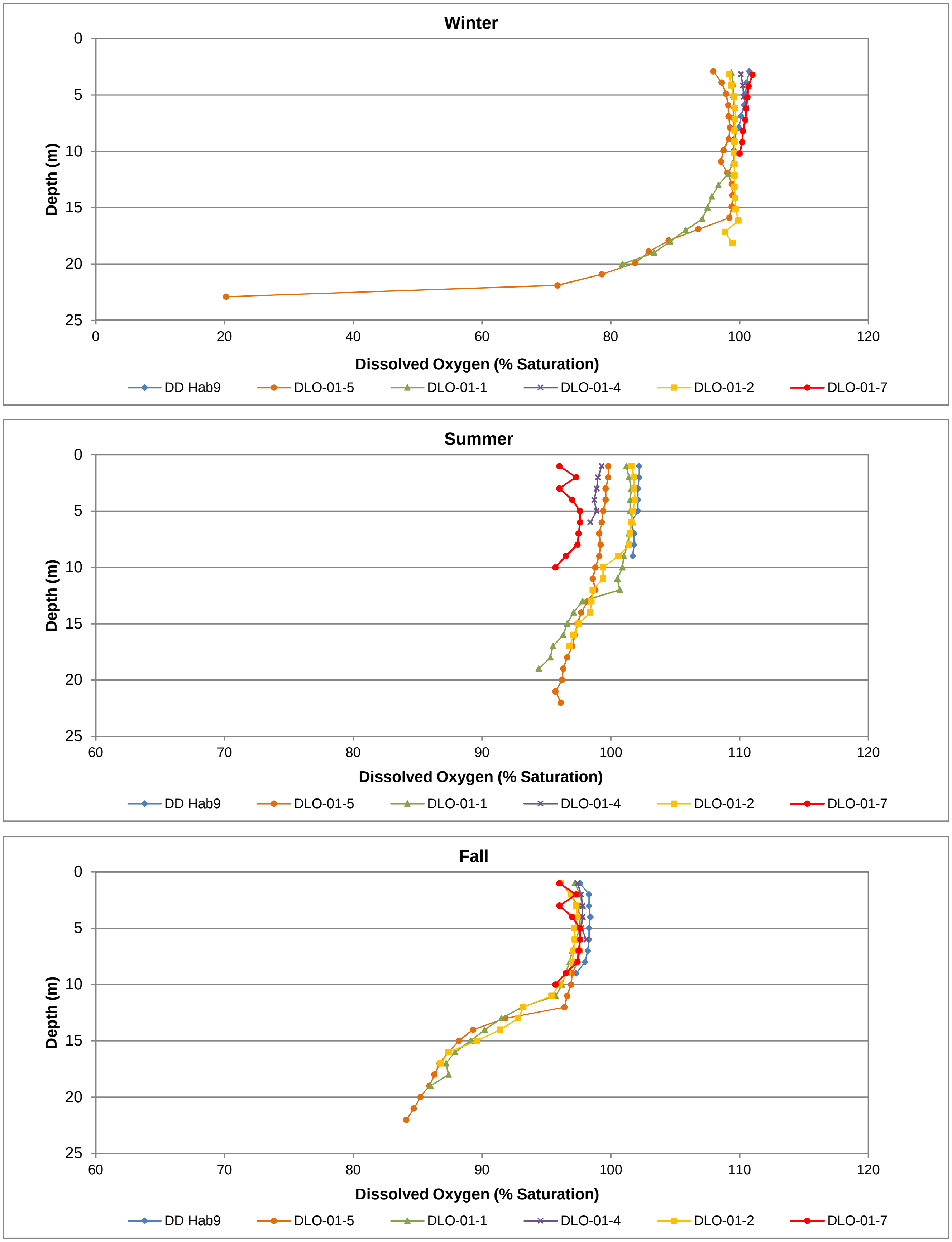


Figure C.11: Vertical profiles of dissolved oxygen measured at Sheardown Lake NW in winter, summer, and fall, 2016.

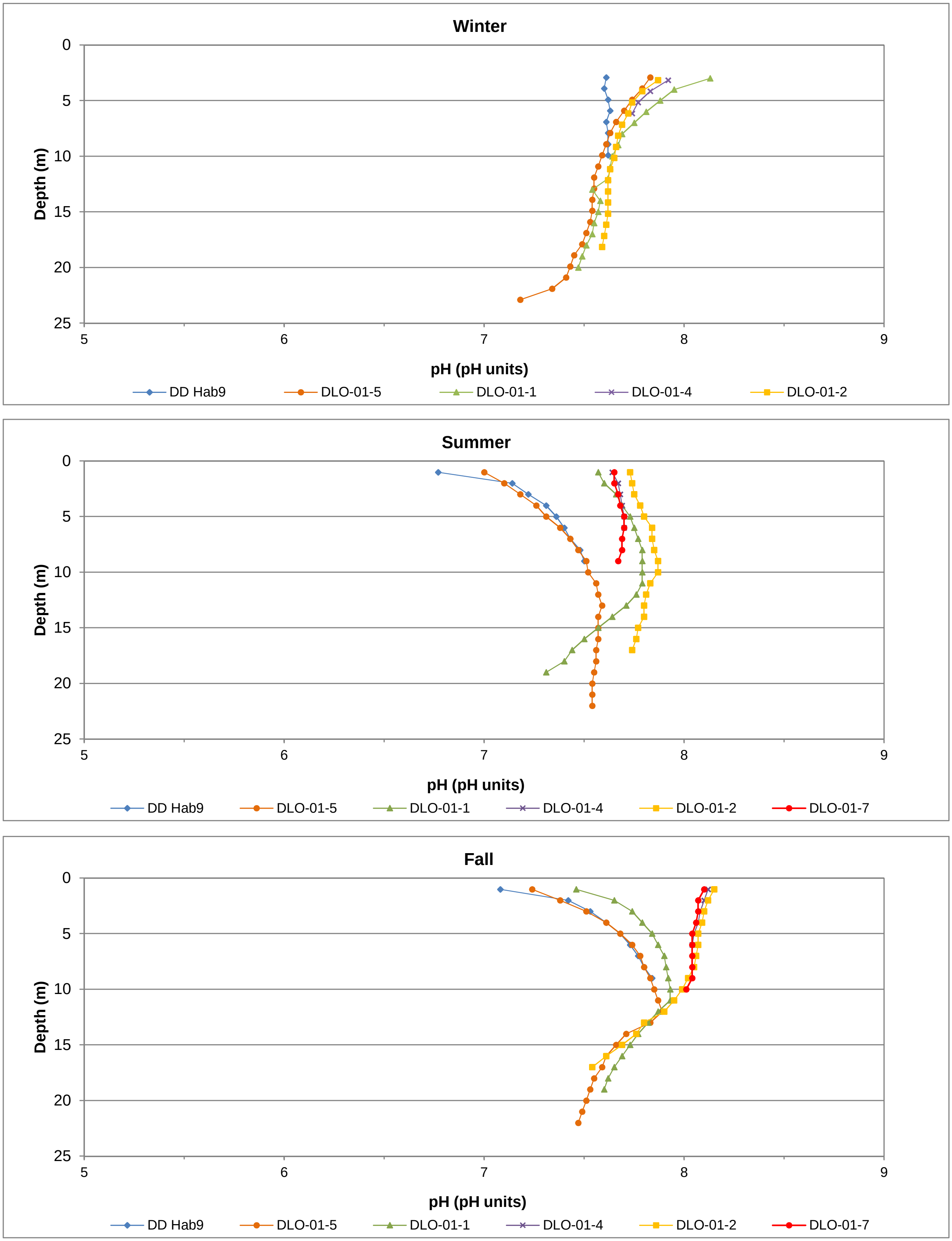


Figure C.12: Vertical profiles of pH measured at Sheardown Lake NW in winter, summer, and fall, 2016.

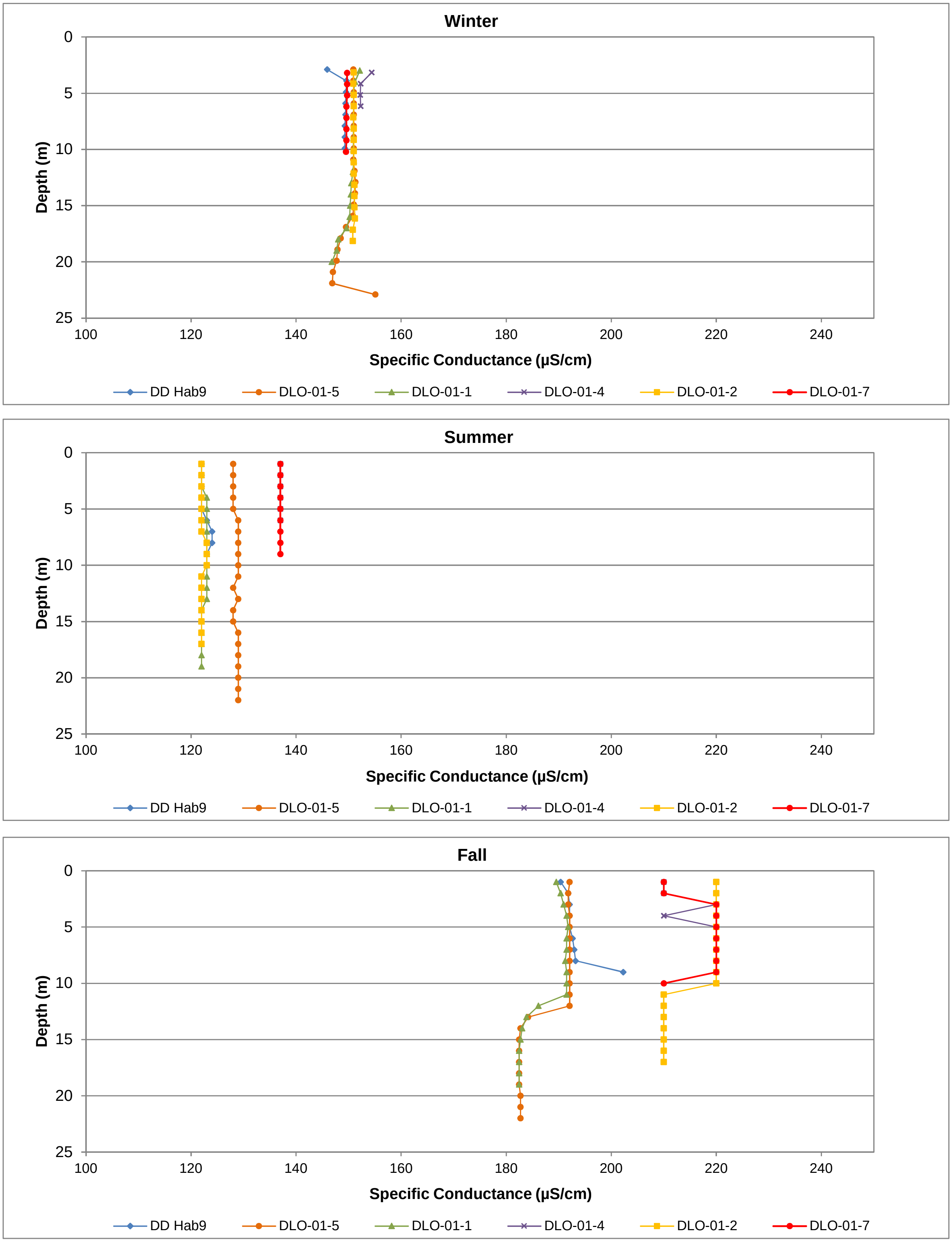


Figure C.13: Vertical profiles of conductivity measured at Sheardown Lake NW in winter, summer, and fall, 2016.

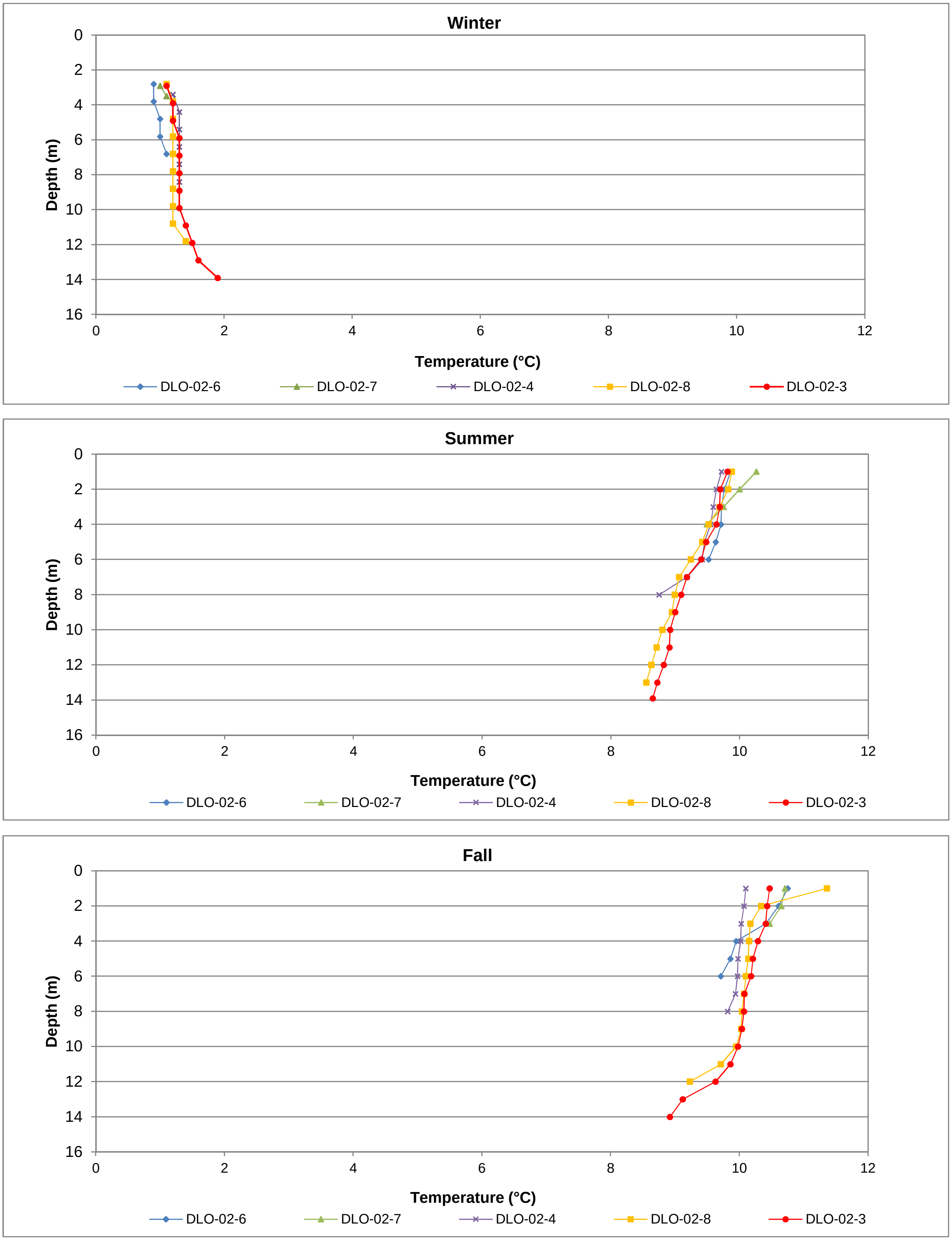
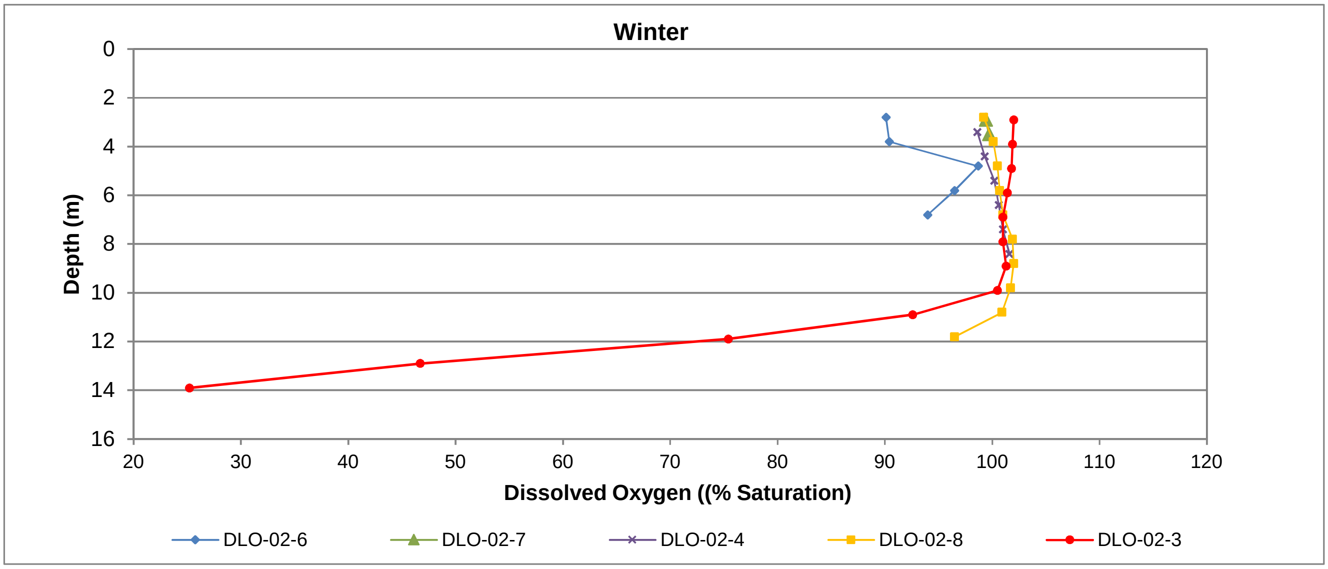
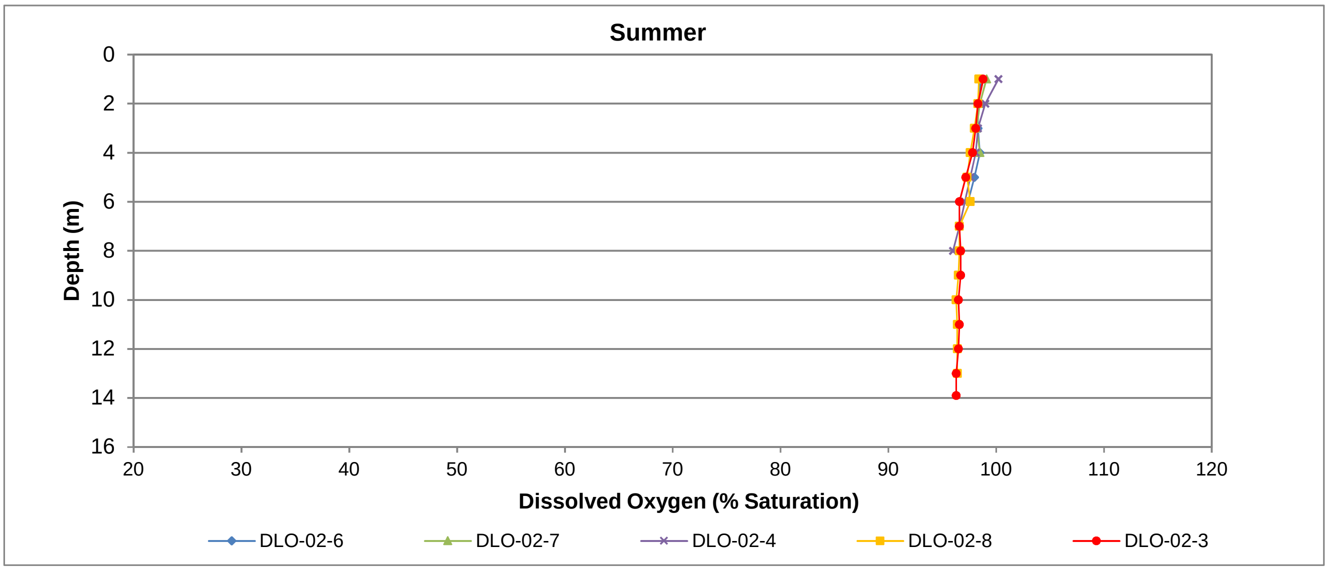


Figure C.14: Vertical profiles of temperature measured at Sheardown Lake SE in winter, summer, and fall, 2016.





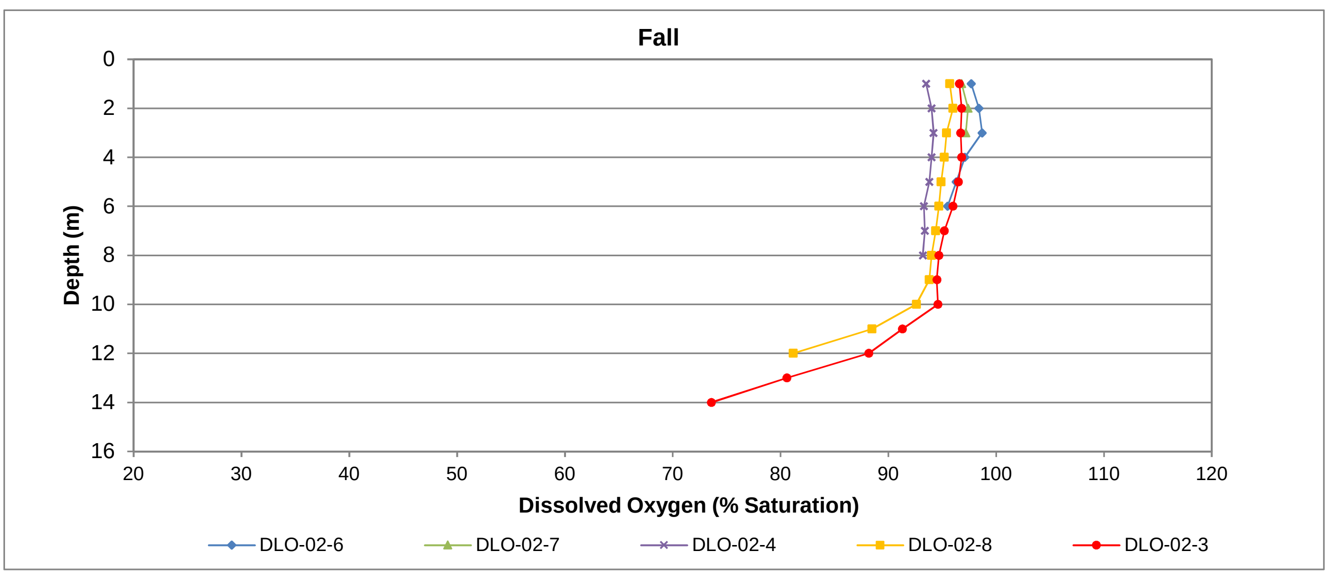


Figure C.15: Vertical profiles of dissolved oxygen measured at Sheardown Lake SE in winter, summer, and fall, 2016.

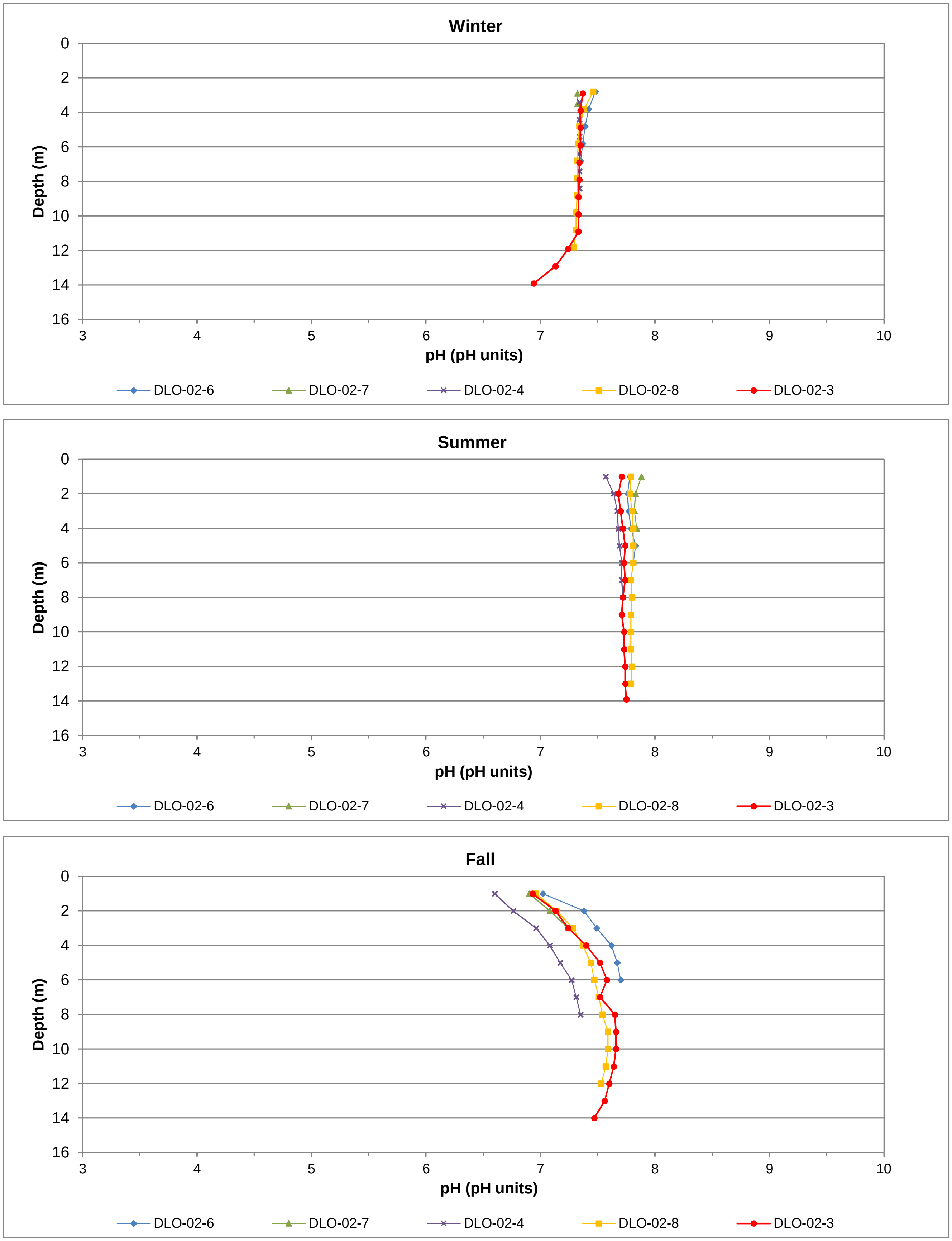


Figure C.16: Vertical profiles of pH measured at Sheardown Lake SE in winter, summer, and fall, 2016.

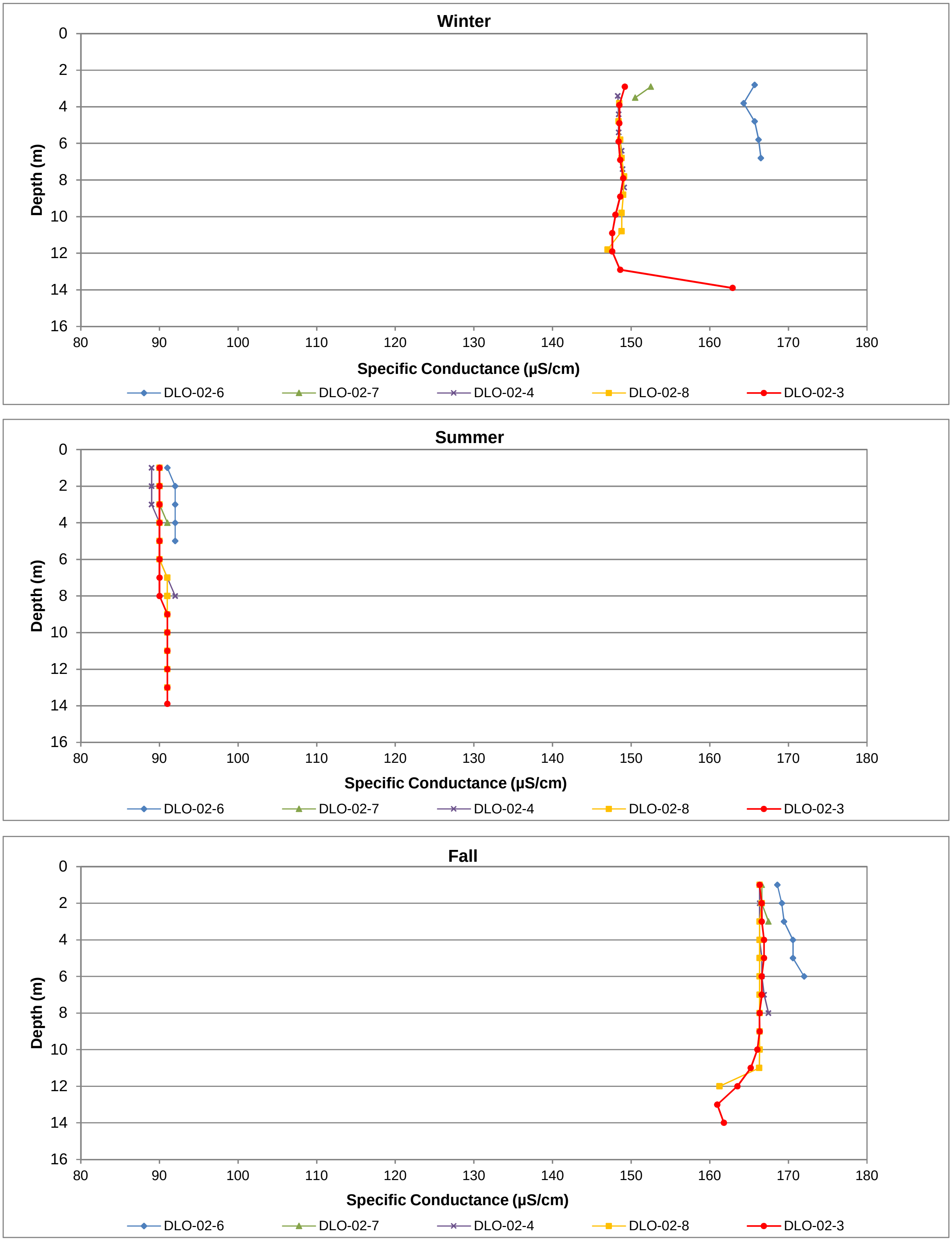


Figure C.17: Vertical profiles of conductivity measured at Sheardown Lake SE in winter, summer, and fall, 2016.

Figure C.18: Temporal comparison of water chemistry at Sheardown Lake Northwest (DLO-01) and Sheardown Lake Southeast (DLO-02) for mine baseline (2005 - 2013), construction (2014), and operational (2015, 2016) periods during fall. Values represent mean ± SD. Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.2 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to Sheardown Lake (northwest and southeast).

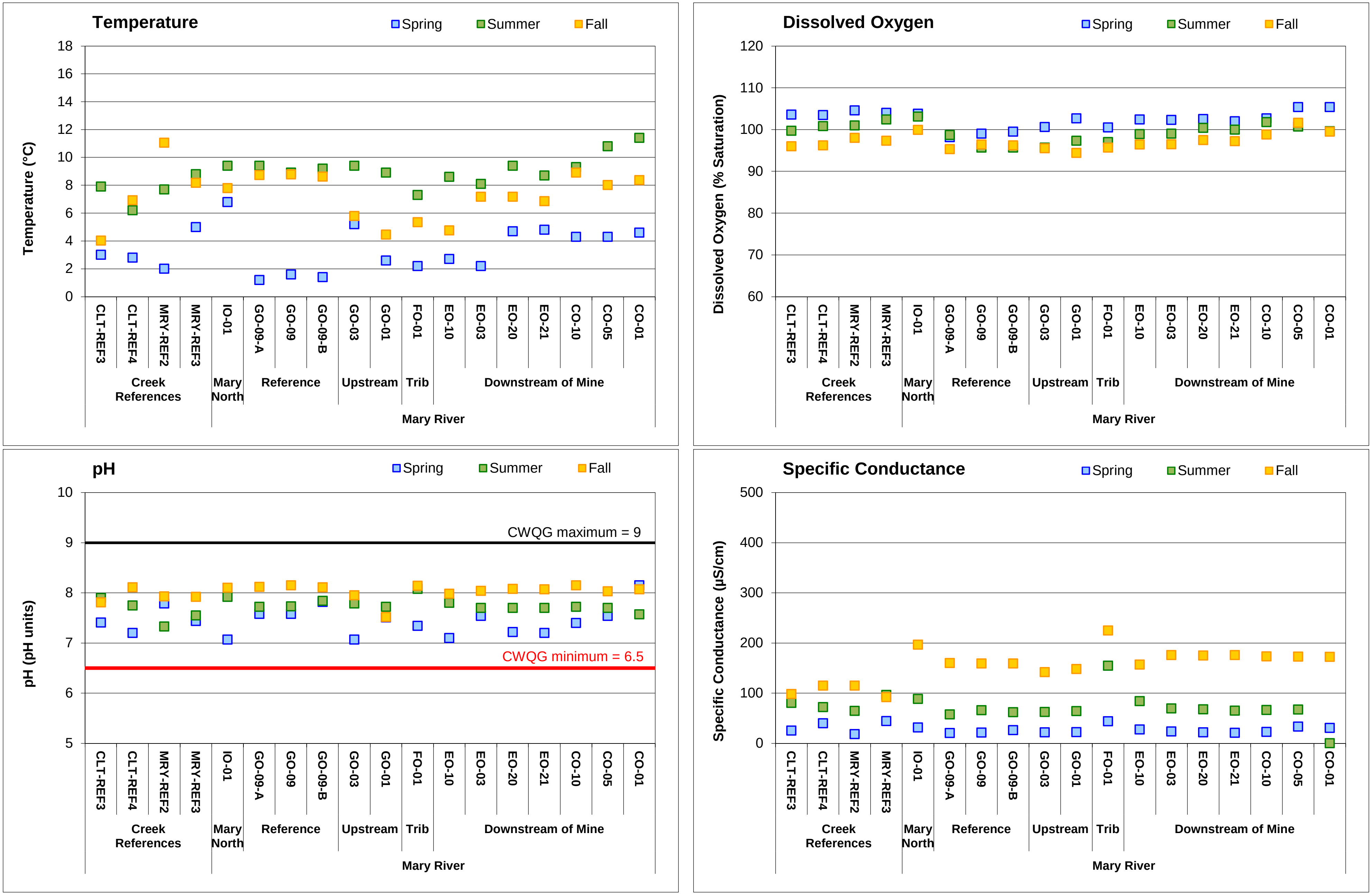


Figure C.19: Comparison of in-situ water quality variables measured at Mary River water quality monitoring stations in spring, summer, and fall 2016, Mary River Project CREMP.

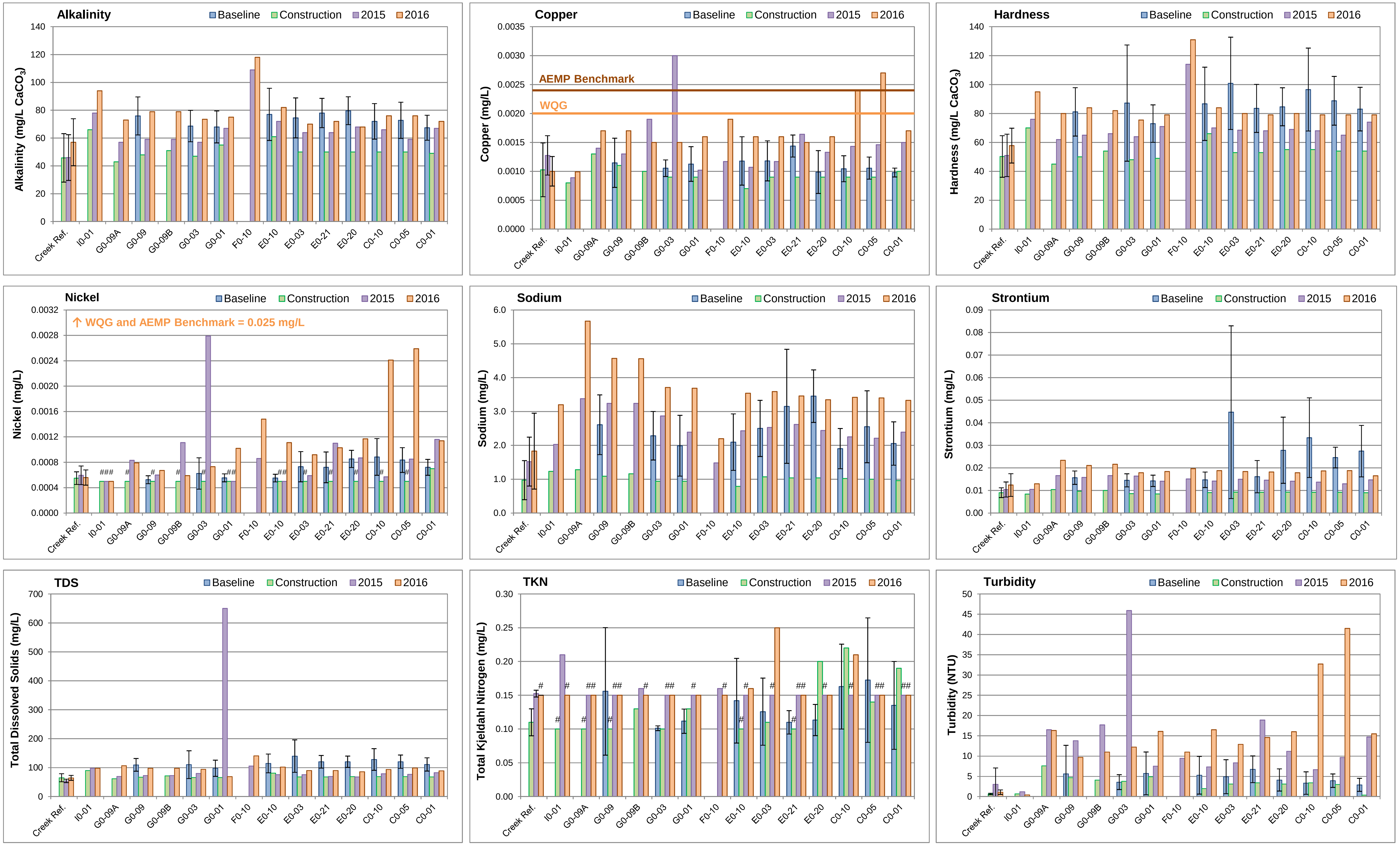


Figure C.20: Temporal comparison of water chemistry at Mary River stations for mine baseline (2005 - 2013), construction (2014) and operational (2015, 2016) periods in the fall. Values represent mean ± SD. Creek reference includes the CLT-REF and MRY-REF series stations (mean ± SD; n = 4). Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.2 for information regarding Water Quality Guidelines (WQG) AEMP Benchmarks are specific to Mary River.

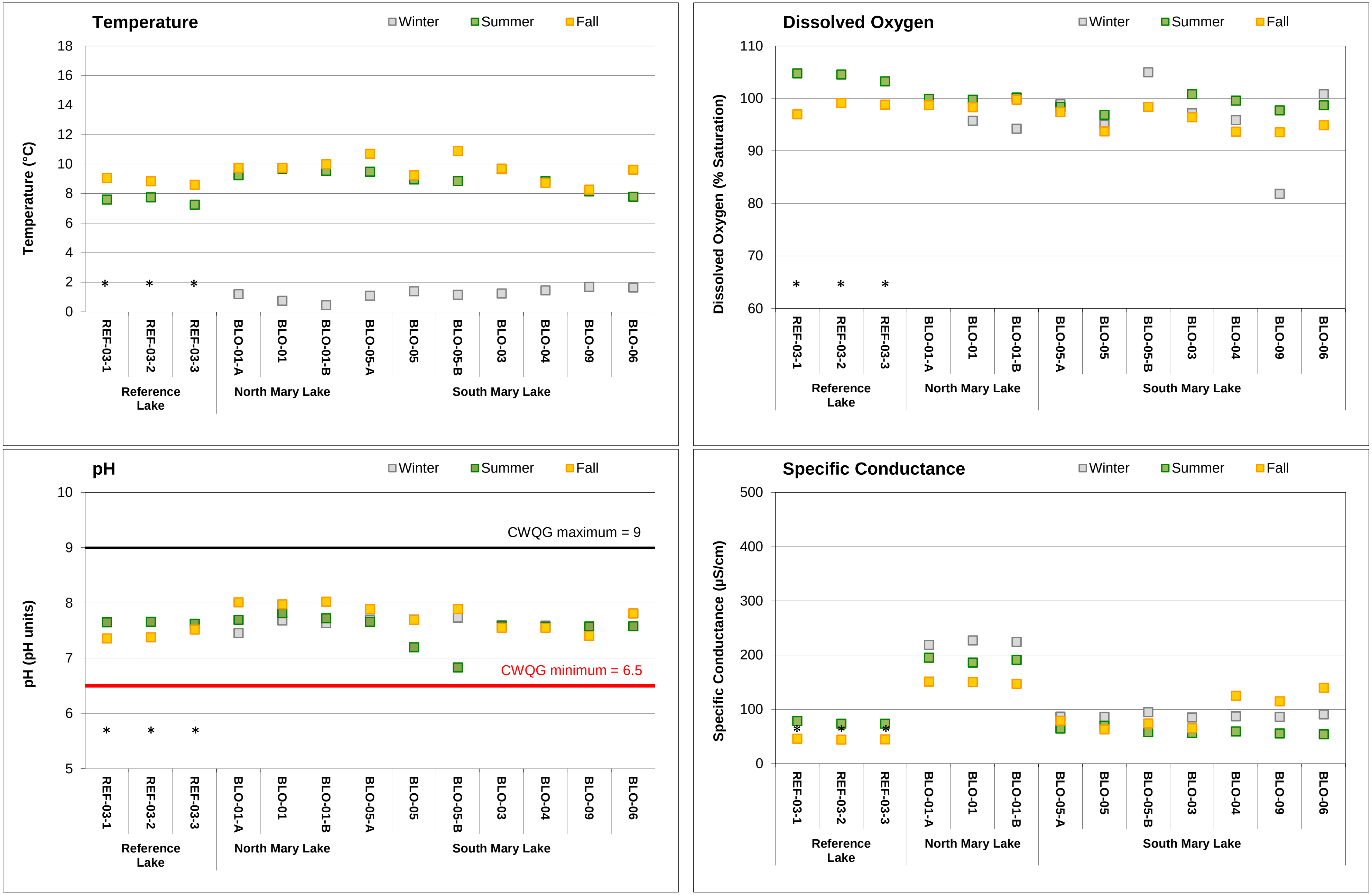


Figure C.21: Comparison of *in-situ* water quality variables measured at Mary Lake water quality monitoring stations in winter, summer, and fall 2016, Mary River Project CREMP. Lake values represent mean of surface and bottom *in-situ* water quality measurements. *Reference Lake 3 (REF-03) was not sampled in winter.

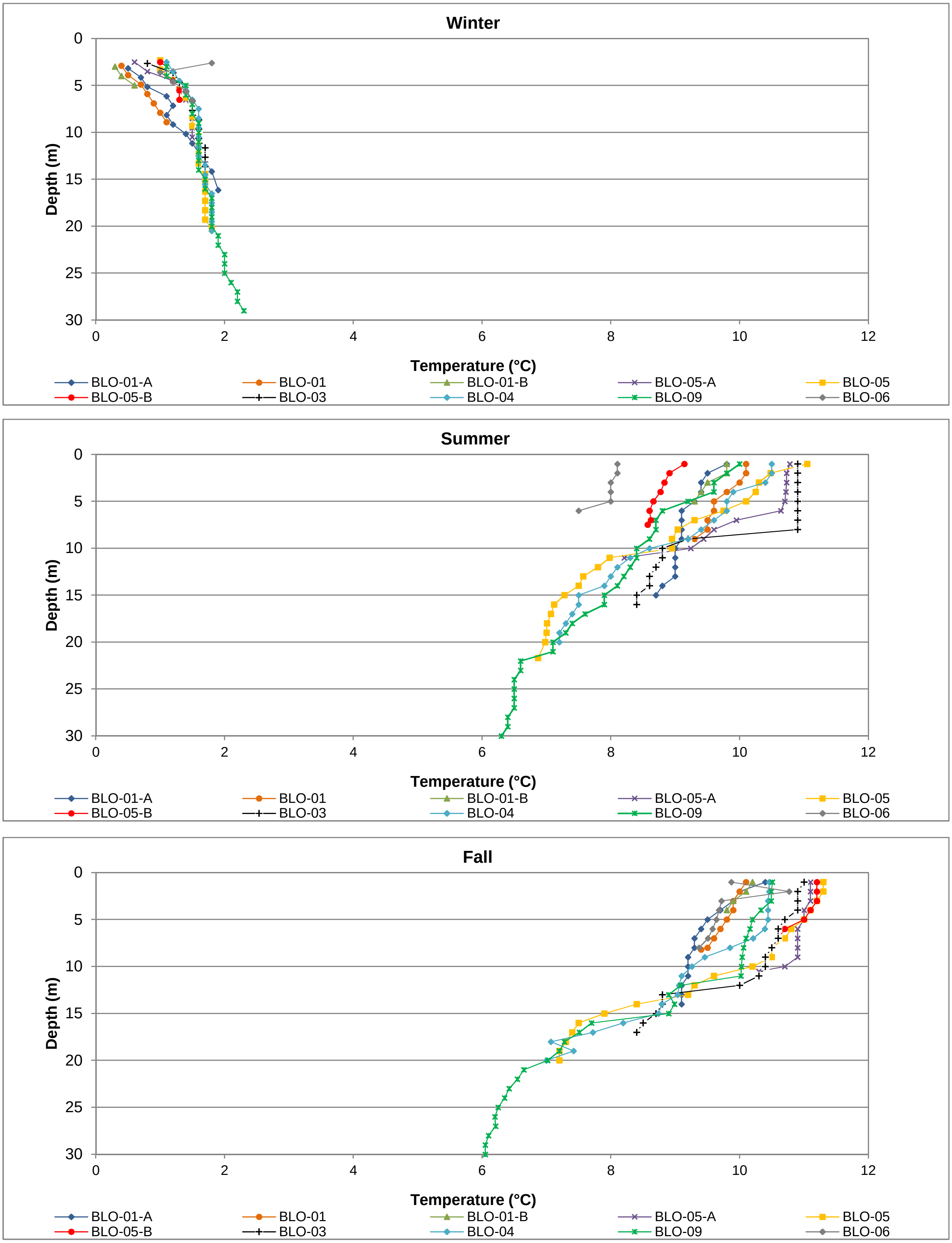


Figure C.22: Vertical profiles of temperature measured at Mary Lake in winter, summer, and fall, 2016.

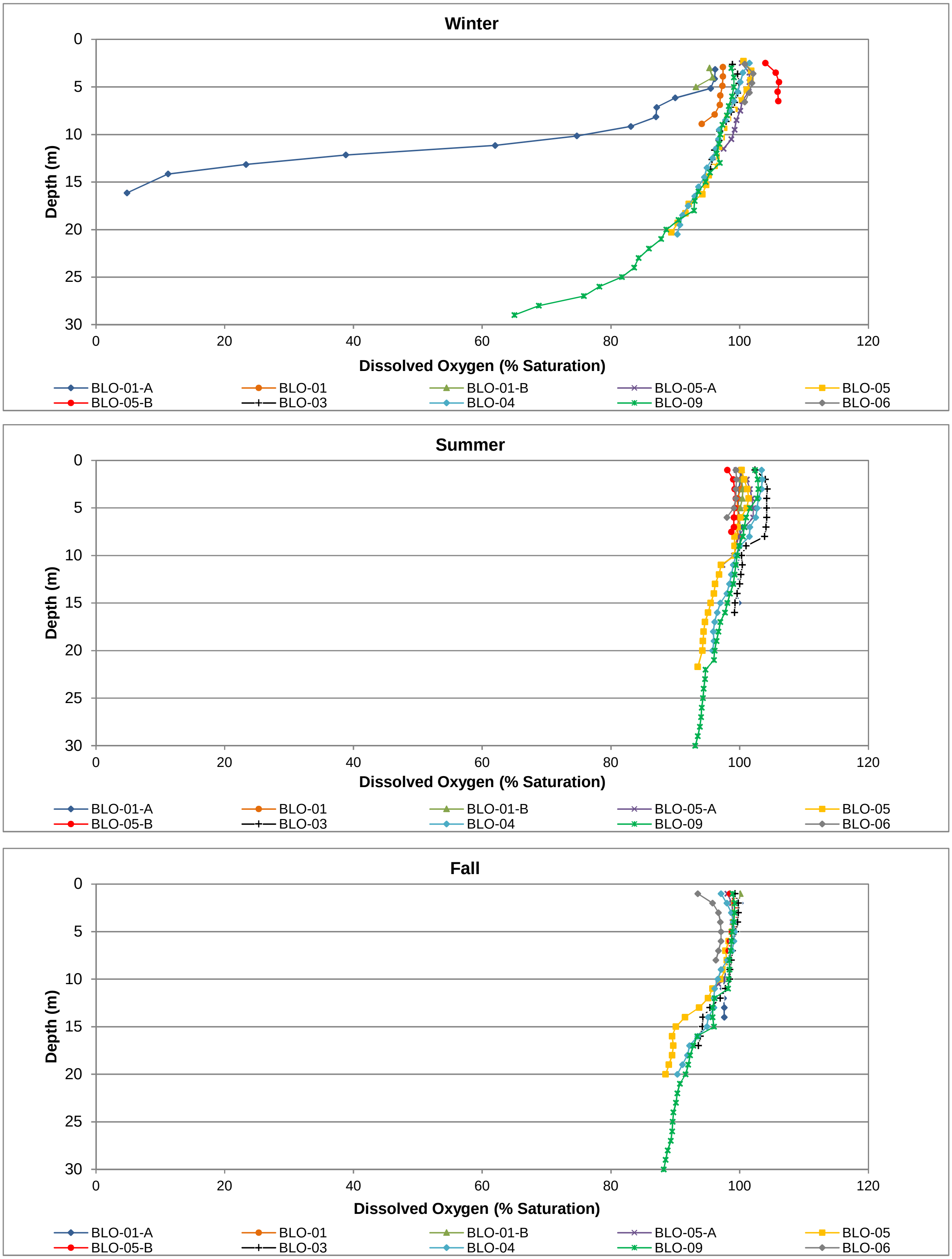
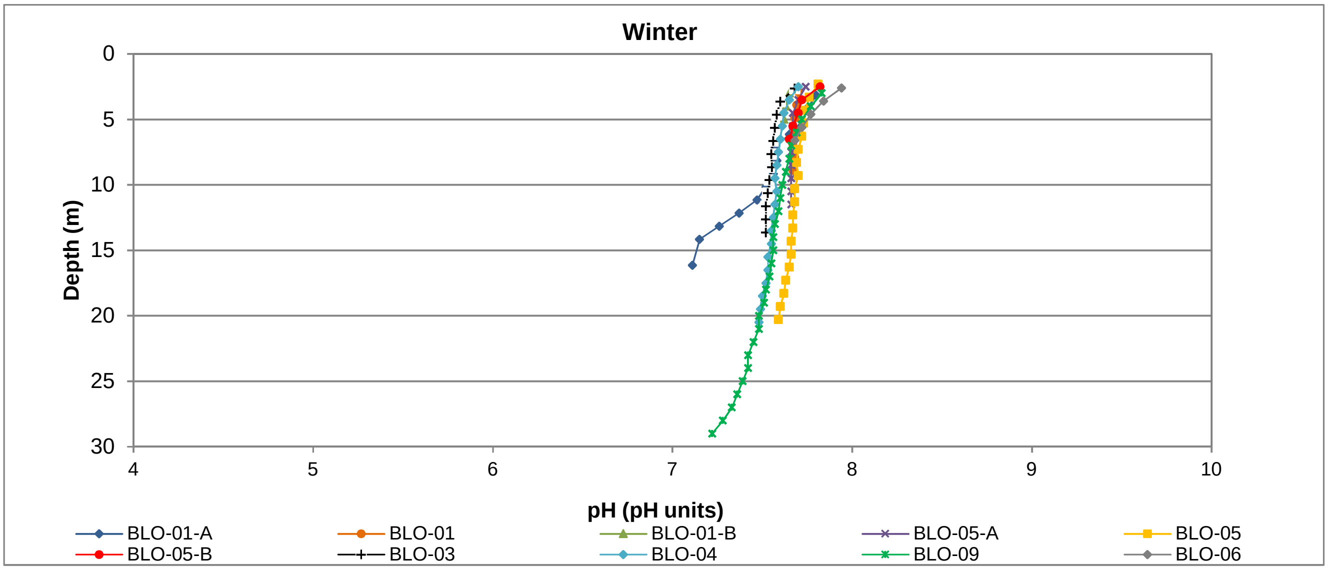
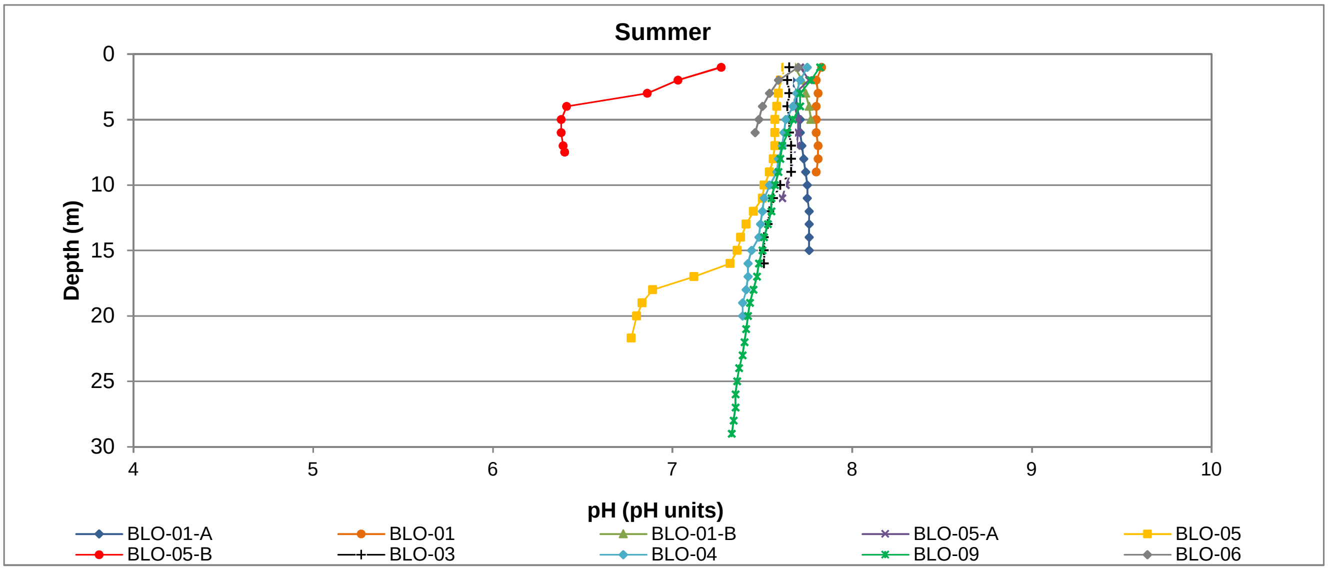


Figure C.23: Vertical profiles of dissolved oxygen measured at Mary Lake in winter, summer, and fall, 2016.





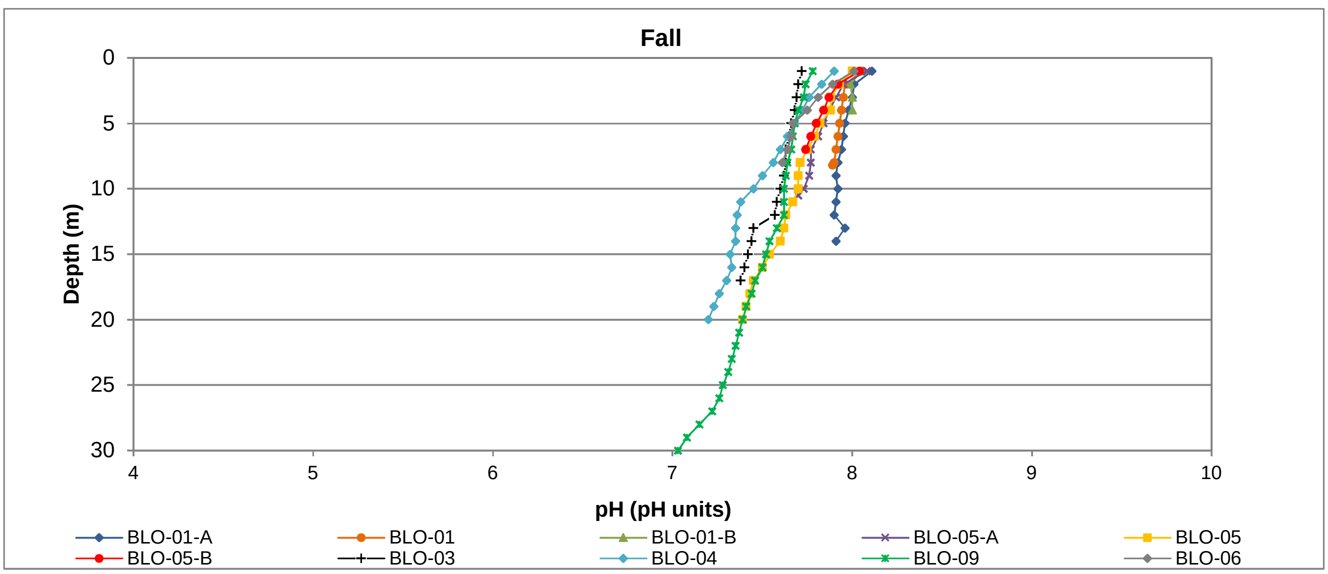


Figure C.24: Vertical profiles of pH measured at Mary Lake in winter, summer, and fall, 2016.

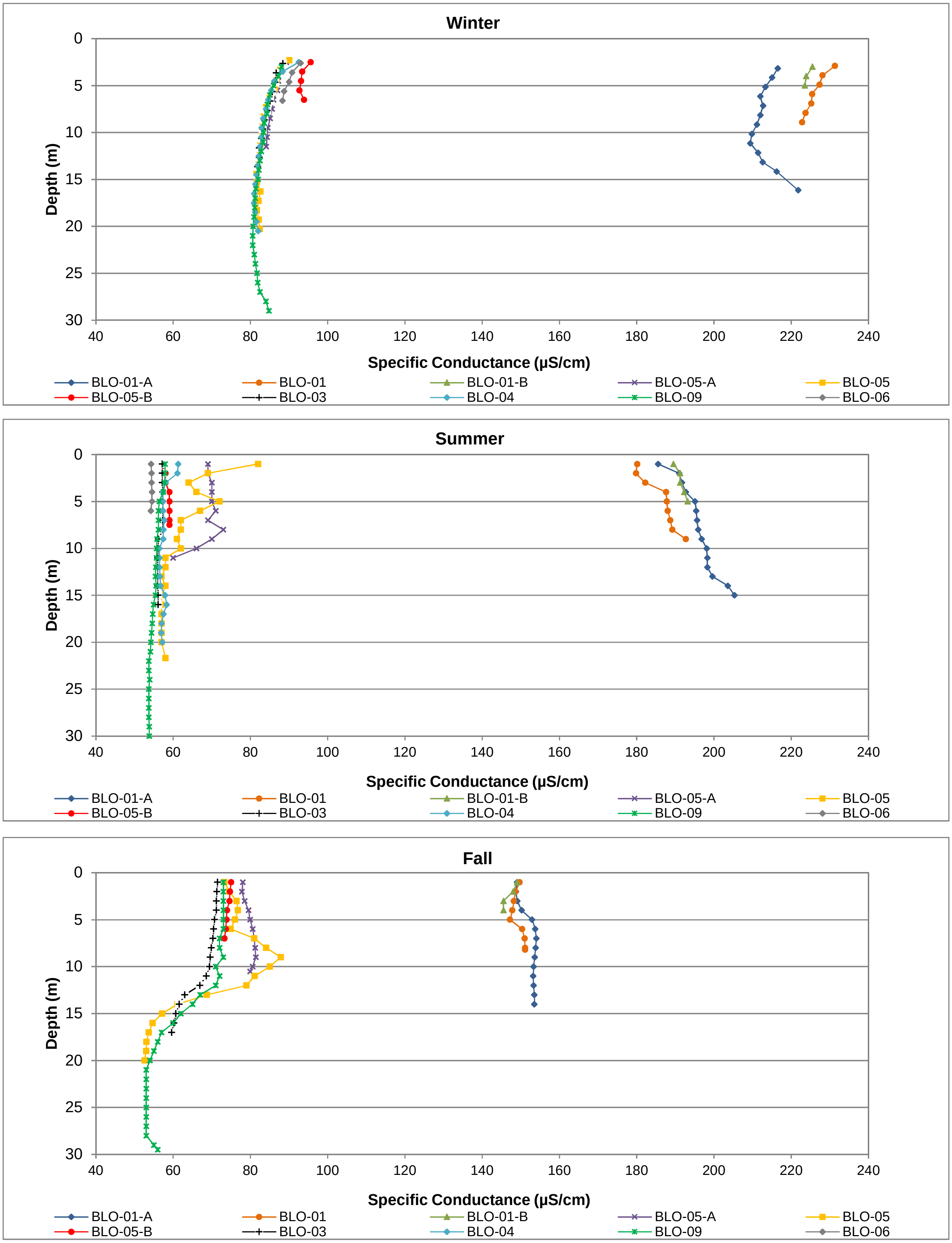


Figure C.25: Vertical profiles of conductivity measured at Mary Lake in winter, summer, and fall, 2016.

Figure C.26: Temporal comparison of water chemistry at Mary Lake (BLO) for mine baseline (2005 - 2013), construction (2014), and operational (2015, 2016) periods during fall. Values represent mean ± SD. Pound symbol (#) indicates parameter concentration is below the laboratory method detection limit. See Table 2.2 for information regarding Water Quality Guideline (WQG) criteria. AEMP Benchmarks are specific to Mary Lake.

APPENDIX D

SEDIMENT QUALITY DATA

Table D.1: Field observations at Reference Lake 3 (REF-03) benthic invertebrate community stations[a], Mary River Project CREMP, August 2016.

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algal Presence
REF-03-1	9.0	gray brown silt with some fine sand; no precipitate layer observed	none detected	sparse moss growth
REF-03-2	8.1	thin orange-brown precipitate layer over brown-gray silt	none detected	sparse moss growth
REF-03-3	10.0	thin orange-brown precipitate layer over medium red-brown sandy-silt	none detected	none observed
REF-03-4	8.8	medium brown coloured silt over gray-brown silt; no precipitate layer	none detected	none observed
REF-03-5	10.7	thin iron oxide precipitate layer over gray-brown silt	none detected	sparse moss growth
REF-03-6	19.5	medium orange-brown coloured silt; no precipitate layer observed	none detected	none observed
REF-03-7	22.9	medium orange-brown coloured silt; no precipitate layer observed	none detected	none observed
REF-03-8	18.6	orange-brown coloured silt with some fine sand, no precipitate layer observed	none detected	none observed
REF-03-9	21.6	thin orange-brown precipitate layer over medium brown silt	none detected	none observed
REF-03-10	19.8	red-brown silt; no precipitate layer observed	none detected	none observed

[a] Sediment particle size and benthic invertebrate community samples were collected by petite-Ponar.

[b] Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

Table D.2: Sediment core observations from cores collected at littoral stations of Reference Lake 3 (REF-03), Mary River Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
REF-03-1	9.0	1	25.0	0 to 10	brown grey silt
				10 to 25	medium grey silt, some black streaking
		2	29.0	0 to 8	brown grey silt
				8 to 29	medium grey silt, some black streaking
		3	28.5	0 to 10	brown grey silt
				10 to 28.5	medium grey silt, some black streaking
REF-03-2	8.1	1	48.5	0 to 1	orange brown floc-like silt
				1 to 43	beige silt, sparse organics
				43 to 48.5	medium to dark brown-grey silt
		2	18.0	0 to 1	orange brown floc-like silt
				1 to 18	beige silt, sparse organics
		3	38.0	0 to 2	orange brown floc-like silt
				2 to 38	beige silt, sparse organics
REF-03-3	10.0	1	13.0	0 to 5	medium beige silt
				5 to 13	light beige silt
		2	10.0	0 to 4	medium beige silt
				4 to 10	light beige silt
		3	18.0	0 to 3	orange brown floc-like silt
				3 to 4	medium beige silt
				5 to 18	light beige silt
REF-03-4	8.8	1	18.5	0 to 8	orange brown floc-like silt
				8 to 18.5	grey beige silt, some black streaking
		2	19.0	0 to 7	orange brown floc-like silt
				7 to 19	grey beige silt, some black streaking
		3	12.0	0 to 8	orange brown floc-like silt
				8 to 12	grey beige silt, some black streaking
REF-03-5	10.7	1	12.5	0 to 1	orange brown silt
				1 to 12.5	medium grey fines with some black streaking
		2	26.0	0 to 3	orange brown silt
				3 to 18	medium grey fines with some black streaking
				18 to 26	medium-dark grey fines with some black streaking
		3	29.0	0 to 2	orange brown silt
				2 to 19	medium grey fines with some black streaking
				19 to 29	medium-dark grey fines with some black streaking

Table D.3: Sediment core observations from cores collected at profundal stations of Reference Lake 3 (REF-03), Mary River Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
REF-03-6	19.5	1	30.0	0 to 27	orange brown silt
				27 to 30	medium grey silt, some black streaking
		2	30.5	0 to 27	orange brown silt
				27 to 30.5	medium grey silt, some black streaking
		3	28.0	0 to 20	orange brown silt
				20 to 24	medium grey silt, some black streaking
				24 to 28	medium-dark grey silt, some black streaking
REF-03-7	22.9	1	16.0	0 to 4	medium orange brown, floc-like silt
				4 to 14	light orange brown silt
				14 to 16	light grey brown silt
		2	25.0	0 to 4	medium orange brown, floc-like silt
				4 to 20	light orange brown silt
				20 to 25	light grey brown silt
		3	21.0	0 to 5	medium orange brown floc-like silt
				5 to 15	light orange brown silt
				15 to 21	light grey brown silt
REF-03-8	18.6	1	8.0	0 to 8	orange brown silt, black layer on top mm
		2	13.0	0 to 15	orange brown silt, black layer on top mm
		3	16.5	0 to 7	orange brown silt, black layer on top mm
				7 to 16	medium grey brown silt with black streaking
REF-03-9	21.6	1	30.0	0 to 20	orange brown silt
				20 to 30	medium grey brown silt
		2	20.0	0 to 18	orange brown silt
				18 to 20	medium grey brown silt
		3	27.0	0 to 24	orange brown silt
				24 to 27	medium grey brown silt
REF-03-DUP (Duplicate of REF-03-9)	21.6	1	19.0	0 to 10	orange brown silt, some black streaking
				10 to 19	grey brown silt, some black streaking
		2	27.0	0 to 10	orange brown silt, some black streaking
				10 to 27	grey brown silt, some black streaking
		3	26.0	0 to 14	orange brown silt, some black streaking
				14 to 26	grey brown silt, some black streaking
REF-03-10	19.8	1	22.0	0 to 8	light brown to orange brown silt
				8 to 18.5	orange brown silt (with black layer at ~ 8mm and very orange below for ~ 1mm)
				18 to 22	grey brown silt
		2	15.0	0 to 12	light brown to orange brown silt
				12 to 15	orange brown silt
		3	21.5	0 to 7	light brown to orange brown silt
				7 to 11	orange brown silt
				11 to 21	grey brown silt

Table D.4: Sediment particle size, total organic carbon, and metal concentrations at Reference Lake 3 (REF-03) sediment stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	Reference Lake 3 Stations										Study Area Summary Statistics		
				REF-03-1 (littoral)	REF-03-6 (profundal)	REF-03-2 (littoral)	REF-03-7 (profundal)	REF-03-3 (littoral)	REF-03-8 (profundal)	REF-03-4 (littoral)	REF-03-9 (profundal)	REF-03-5 (littoral)	REF-03-10 (profundal)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	66.6	20.5	32.9	13.0	39.8	15.2	53.5	14.5	19.9	20.2	29.6	18.4	5.81
	Silt	%	-	31.1	72.3	59.8	78.3	56.5	78.4	43.9	78.3	74.0	73.1	64.6	16.42	5.19
	Clay	%	-	2.30	7.2	7.4	8.7	3.70	6.3	2.70	7.3	6.10	6.7	5.8	2.17	0.69
	Moisture	%	-	95.4	72.9	99.0	70.5	89.8	93.2	97.7	83.3	66.6	97.6	87	12.42	3.93
	Total Organic Carbon	%	10^{α}	5.39	4.31	8.04	4.82	3.30	5.03	4.09	4.41	3.42	4.65	4.75	1.33	0.421
Metals	Aluminum (Al)	mg/kg	-	15,200	23,700	17,700	30,300	16,600	25,500	16,400	21,850	16,500	24,400	20,815	5,069	1,603
	Antimony (Sb)	mg/kg	-	<0.10	0.19	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0
	Arsenic (As)	mg/kg	17	2.74	5.96	3.87	7.24	4.23	6.98	3.67	5.94	4.04	6.25	5.09	1.56	0.493
	Barium (Ba)	mg/kg	-	115	144	153	187	96.4	167	96.6	164	98.4	147	137	32.9	10.41
	Beryllium (Be)	mg/kg	-	0.61	0.96	0.70	1.20	0.70	1.04	0.69	0.91	0.67	0.99	0.85	0.20	0.063
	Bismuth (Bi)	mg/kg	-	<0.20	<0.20	<0.20	0.22	<0.20	0.21	<0.20	<0.20	<0.20	<0.20	0.20	0.0067	0.0021
	Boron (B)	mg/kg	-	11.4	17.8	16.4	22.4	12.1	20.3	12.4	17.2	12.9	18.1	16.1	3.76	1.19
	Cadmium (Cd)	mg/kg	3.5	0.135	0.165	0.284	0.200	0.095	0.205	0.096	0.178	0.121	0.153	0.16	0.057	0.018
	Calcium (Ca)	mg/kg	-	6,190	6,000	6,310	6,630	4,230	6,040	4,150	5,675	4,760	6,210	5,620	902	285.3
	Chromium (Cr)	mg/kg	90	57.2	74.3	57.7	93.8	52.6	84.2	51.8	71.4	55.5	76.1	67.5	14.6	4.62
	Cobalt (Co)	mg/kg	-	8.87	16.9	8.86	20.9	11.6	18.6	11.2	17.4	10.2	17.0	14.1	4.45	1.41
	Copper (Cu)	mg/kg	197	55.3	94.6	95.5	121	60.3	105	63.6	88.2	57.7	98.1	83.9	23.0	7.28
	Iron (Fe)	mg/kg	$40,000^{\alpha}$	21,400	49,200	21,400	60,700	34,900	55,200	37,400	53,900	34,100	48,900	41,710	13,932	4,406
	Lead (Pb)	mg/kg	91.3	15.2	25.5	95.9	26.7	79.9	48.8	24.2	27.4	15.0	19.2	37.8	28.31	8.95
	Lithium (Li)	mg/kg	-	27.4	37.4	28.3	49.4	27.9	42.8	26.9	38.3	26.1	40.8	34.5	8.26	2.61
	Magnesium (Mg)	mg/kg	-	11,600	15,300	11,200	19,000	10,700	16,700	9,960	14,200	10,800	15,600	13,506	3,077	973
	Manganese (Mn)	mg/kg	$1,100^{\alpha,\beta}$	286	1,170	297	1,420	686	2,020	767	3,550	442	1,170	1,181	995.5	314.8
	Mercury (Hg)	mg/kg	0.486	0.0475	0.0633	0.0515	0.0699	0.0199	0.0738	0.0234	0.0737	0.0353	0.0687	0.0527	0.0206	0.00651
	Molybdenum (Mo)	mg/kg	-	0.72	2.75	1.36	3.20	3.18	3.35	2.72	4.49	2.97	2.56	2.73	1.05	0.332
	Nickel (Ni)	mg/kg	$75^{\alpha,\beta}$	40.1	53.3	44.4	65.1	35.8	59.1	35.7	50.9	37.1	53.0	47.4	10.37	3.28
	Phosphorus (P)	mg/kg	$2,000^{\alpha}$	781	1,050	760	1,320	827	1,180	810	1,016	1,020	1,040	980	184.8	58.4
	Potassium (K)	mg/kg	-	3,280	5,460	4,260	6,870	4,170	6,040	3,820	5,255	3,940	5,830	4,893	1,161	367.3
	Selenium (Se)	mg/kg	-	0.45	0.67	0.69	0.93	0.36	1.00	0.39	0.87	0.55	0.78	0.67	0.23	0.072
	Silver (Ag)	mg/kg	-	0.11	0.24	0.16	0.32	<0.10	0.28	<0.10	0.24	0.11	0.26	0.19	0.085	0.027
	Sodium (Na)	mg/kg	-	254	412	403	527	260	491	250	406	313	437	375	100	31.8
	Strontium (Sr)	mg/kg	-	12.1	14.7	12.9	17.8	10.3	16.3	10.0	14.8	11.5	15.5	13.6	2.63	0.83
	Sulphur (S)	mg/kg	-	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	0	0
	Thallium (Tl)	mg/kg	-	0.325	0.723	0.389	0.916	0.418	0.845	0.362	0.772	0.445	0.748	0.594	0.226	0.0715
	Tin (Sn)	mg/kg	-	5.9	9.9	137	7.9	116	46.4	17.9	15.2	4.8	2.3	36.3	49.39	15.619
	Titanium (Ti)	mg/kg	-	1,050	1,280	1,060	1,580	1,010	1,370	1,030	1,205	1,210	1,220	1,202	179	56.5
	Uranium (U)	mg/kg	-	8.73	26.4	10.9	31.6	17.5	29.5	9.95	22.8	12.4	26.0	19.6	8.71	2.75
	Vanadium (V)	mg/kg	-	45.0	68.6	50.7	84.0	51.6	75.4	52.5	63.4	50.1	68.8	61.0	12.9	4.09
	Zinc (Zn)	mg/kg	315	67.3	101	82.2	122	70.0	109	77.0	91.2	72.0	101	89	18.5	5.86
	Zirconium (Zr)	mg/kg	-	5.0	3.6	6.5	4.6	3.3	4.2	3.2	3.7	3.7	3.9	4.2	1.0	0.3

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2015)).

(grey box) Indicates paramter concentration above Sediment Quality Guideline (SQG).

Table D.5: Field observations at Camp Lake (JLO) benthic invertebrate community stations[a], Mary River Project CREMP, August 2016.

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algal Presence
JLO-2	10.6	medium to light brown silt, some reddish ozidized material to ~ 0.5cm surficial depth	none detected	root-like organics (sparse), globular algae (sparse)
JLO-21	11.1	medium brown grey silt with some fine sand; 0.5cm layer of red oxidized material at surface	none detected	globular algae (common)
JLO-32	9.9	loose' medium brown silt with thin layer of oxidized material at surface	none detected	(dead) moss leaves; globular algae (common)
JLO-31	11.7	medium brown silt; 0.5cm layer of red oxidized material at surface	none detected	globular algae (common)
JLO-30	10.6	light brown grey silt / fine sand mix; 0.5cm layer of red oxidized material at surface	none detected	globular algae (sparse)

[a] Sediment particle size and benthic invertebrate community samples were collected by petite-Ponar.

[b] Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

Table D.6: Sediment core observations from cores collected at littoral stations of Camp Lake (JLO), Mary Rive Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
JLO-02	10.6	1	14.0	0 to 2	orange to black coloured organic silt
				2 to 6	dark orangish-brown silt with black streaking
				6 to 14	medium brown silt
		2	12.0	0 to 2	orange black organic silt
				2 to 6	dark orangish-brown silt with black streaking
				6 to 12	medium brown silt
		3	15.5	0 to 2.5	orange black organic silt
				2.5 to 5	dark orangish-brown silt with black streaking
				5 to 15.5	medium brown silt
JLO-30	10.6	1	8.0	0 to 1.5	orange-coloured (iron oxide) sand
				1.5 to 8	light brown grey sand
		2	5.0	0 to 0.5	orange-coloured (iron oxide) sand
				0.5 to 5	light brown grey sand; evidence of anoxia at 2 cm
		3	4.5	0 to 0.5	orange-coloured (iron oxide) sand
				0.5 to 4.5	light brown grey sand
JLO-31	11.7	1	21.0	0 to 2	orange-coloured (iron oxide) organic silt
				2 to 13	light brown grey silt
				13 to 21	medium brown grey silt
		2	13.5	0 to 1.5	orange coloured (iron oxide) organic silt
				1.5 to 13.5	medium brown grey silt
		3	11.0	0 to 2	orange coloured (iron oxide) organic silt
				2 to 11	medium brown grey silt
JLO-32	9.9	1	19.0	0 to 2	orangish-coloured (iron oxide) silt
				2 to 4	bright orange (iron oxide) smear
				4 to 11	medium light brown grey silt
				11 to 19	medium brown grey silt
		2	18.0	0 to 3	silty organics, globular algae
				3 to 7	olive brown organic silt
				7 to 18	medium light brown silt / sand
		3	13.5	0 to 3	orangish-coloured (iron oxide) silt
				3 to 13.5	medium light brown grey silt
JLO-21	11.1	1	13.5	0 to 1.5	orangish-coloured (iron oxide) silt
				1.5 to 13.5	light brown silt
		2	16.5	0 to 1.5	orangish-coloured (iron oxide) silt
				1.5 to 16.5	light brown silt
		3	11.5	0 to 2	orangish-coloured (iron oxide) silt
				2 to 11.5	light brown silt

Table D.7: Sediment core observations from cores collected at profundal stations of Camp Lake (JLO), Mary River Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
JLO-14	26.5	1	12.5	0 to 3	reddish brown oxidized silt
				3 to 10	light brown grey silt
				10 to 12.5	medium brown grey silt
		2	13.0	0 to 3	reddish brown oxidized silt
				3 to 8	light brown grey silt
				8 to 13	medium brown grey silt; possible anoxia
		3	22.5	0 to 4	reddish brown oxidized silt
				4 to 9.5	light brown grey silt
				9.5 to 22	medium brown grey silt; possible anoxia
JLO-07	33.2	1	19.5	0 to 2	reddish-orange oxidized silt
				2 to 10	light brown grey; reduced streaks
				10 to 19.5	medium brown grey
		2	7.5	0 to 4	reddish-orange oxidized silt
				4 to 7.5	light brown grey
		3	10.0	0 to 2	reddish-orange oxidized silt
				2 to 7	light brown grey; reduced streaks
				7 to 10	medium brown grey
JLO-11	28.8	1	14.5	0 to 1.5	reddish-orange oxidized silt
				1.5 to 7	light brown grey silt
				7	redox boundary (band of anoxia)
				7 to 14.5	medium light brown grey silt
		2	17.5	0 to 1.5	reddish-orange oxidized silt
				1 to 6.5	light brown grey silt
				6.5	redox boundary (band of anoxia)
				6.5 to 17.5	medium light brown grey silt
		3	21.5	0 to 2	reddish-orange oxidized silt
				2 to 13	light brown grey silt
				13 to 21.5	medium brown grey silt

Table D.8: Statistical comparison of substrate physical properties at littoral depth stations between Camp Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

Habitat Variable	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Station Type	n	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Sand (% by weight)	No	0.783	α, δ, γ	Reference	5	42.5	18.1	8.1	19.9	66.6
				Camp	5	45.8	17.8	8.0	32.7	76.8
Silt (% by weight)	No	0.816	α, δ, γ	Reference	5	53.1	16.3	7.3	31.1	74.0
				Camp	5	50.6	16.5	7.4	22.0	61.5
Clay (% by weight)	No	0.574	α, δ, γ	Reference	5	4.4	2.2	1.0	2.3	7.4
				Camp	5	3.7	2.0	0.9	1.2	5.9
Moisture (%)	Yes	0.095	γ	Reference	5	89.7	13.4	6.0	66.6	99.0
				Camp	5	73.5	9.3	4.2	59.4	82.8
TOC (%)	Yes	0.071	α, δ, γ	Reference	5	4.8	2.0	0.9	3.3	8.0
				Camp	5	2.9	0.8	0.4	1.5	3.5

[a] Data analysis included: α - data untransformed; β - data logit transformed; η - log_{10} transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table D.9: Sediment particle size, total organic carbon, and metal concentrations at Camp Lake (JLO) sediment stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Camp Lake Stations								Study Area Summary Statistics		
					JLO-02 (littoral)	JLO-21 (littoral)	JLO-32 (littoral)	JLO-14 (profundal)	JLO-31 (littoral)	JLO-07 (profundal)	JLO-11 (profundal)	JLO-30 (littoral)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	32.7	43.1	35.7	35.8	40.6	48.8	53.6	76.8	46	14	5.1
	Silt	%	-	-	61.5	51.5	60.9	55.6	57.0	43.6	41.8	22.0	49	13	4.7
	Clay	%	-	-	5.9	5.4	3.4	8.6	2.4	7.6	4.6	1.2	4.9	2.5	0.9
	Moisture	%	-	-	69.3	78.9	77.2	76.6	82.8	63.6	66.3	59.4	72	8	2.93
	Total Organic Carbon	%	10[α]	-	3.36	3.17	3.49	2.39	2.85	2.50	2.59	1.49	2.73	0.64	0.23
Metals	Aluminum (Al)	mg/kg	-	-	17,000	14,700	14,800	19,500	14,100	19,700	17,500	6,700	15,500	4,148	1,466
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.011	0.0038
	Arsenic (As)	mg/kg	17	5.9	***9.6***	5.82	***13.8***	***8.01***	***11.4***	5.31	***13.5***	2.86	***8.79***	3.99	1.41
	Barium (Ba)	mg/kg	-	-	170	78.7	171	190	176	83.3	105	43.3	127	55.9	19.8
	Beryllium (Be)	mg/kg	-	-	0.89	0.90	0.86	1.05	0.81	1.10	0.96	0.38	0.87	0.22	0.078
	Bismuth (Bi)	mg/kg	-	-	0.29	0.42	0.35	0.30	0.26	0.36	0.31	<0.20	0.31	0.067	0.024
	Boron (B)	mg/kg	-	-	22.5	23.8	23.9	28.5	23.9	30.1	25.1	10.5	23.5	5.87	2.08
	Cadmium (Cd)	mg/kg	3.5	1.5	0.267	0.180	0.319	0.223	0.178	0.129	0.177	0.061	0.19	0.080	0.028
	Calcium (Ca)	mg/kg	-	-	4,900	4,600	5,880	4,680	4,470	4,560	4,380	2,170	4,455	1,038	367
	Chromium (Cr)	mg/kg	90	98	72.3	61.8	63.2	77.4	58.8	78.9	72.3	31.3	64.5	15.3	5.41
	Cobalt (Co)	mg/kg	-	-	20.9	16.3	20.0	24.7	20.1	17.7	18.5	7.76	18.2	4.91	1.74
	Copper (Cu)	mg/kg	197	50	48.4	38.7	***50.4***	49.5	37.6	***50.8***	49.1	16.1	42.6	11.9	4.21
	Iron (Fe)	mg/kg	40,000[α]	52,400	49,050	38,700	***57,600***	***66,400***	***73,500***	44,700	***73,800***	21,900	***53,206***	18,164	6,422
	Lead (Pb)	mg/kg	91.3	35	20.6	23.8	22.4	24.0	19.7	25.8	22.4	13.4	21.5	3.81	1.35
	Lithium (Li)	mg/kg	-	-	28.9	32.2	26.9	35.5	26.7	37.0	31.4	12.9	28.9	7.48	2.64
	Magnesium (Mg)	mg/kg	-	-	14,050	11,800	11,900	13,700	10,400	13,900	13,100	5,810	11,833	2,742	969
	Manganese (Mn)	mg/kg	1,100[α,β]	4,370	2,540	526	***4,690***	***5,470***	3,770	815	635	1,390	2,480	1,952	690.2
	Mercury (Hg)	mg/kg	0.486	0.17	0.0458	0.0411	0.0470	0.0512	0.0379	0.0536	0.0618	0.0120	0.0438	0.0148	0.00525
	Molybdenum (Mo)	mg/kg	-	-	2.02	1.01	4.10	3.00	5.07	0.93	1.42	1.00	2.32	1.58	0.559
	Nickel (Ni)	mg/kg	75[α,β]	72	***80.7***	61.4	***80.3***	***75.3***	69.1	66.3	67.5	31.9	66.6	15.6	5.51
	Phosphorus (P)	mg/kg	2,000[α]	1,580	1,580	1,360	***1,690***	***2,170***	***2,280***	1,380	***2,860***	697	***1,752***	668	236
	Potassium (K)	mg/kg	-	-	4,055	3,710	3,780	4,910	3,680	5,040	4,370	1,690	3,904	1,038	367
	Selenium (Se)	mg/kg	-	-	0.43	0.44	0.48	0.53	0.41	0.47	0.62	<0.20	0.45	0.12	0.043
	Silver (Ag)	mg/kg	-	-	0.11	0.11	0.12	0.15	<0.10	0.17	0.14	<0.10	0.13	0.026	0.009
	Sodium (Na)	mg/kg	-	-	190	169	167	249	157	320	253	78	198	74	26
	Strontium (Sr)	mg/kg	-	-	9.46	9.31	10.6	14.9	10.1	19.5	11.7	5.24	11.4	4.25	1.50
	Sulphur (S)	mg/kg	-	-	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5000	0	0
	Thallium (Tl)	mg/kg	-	-	0.554	0.478	0.619	0.641	0.532	0.447	0.423	0.190	0.485	0.142	0.0503
	Tin (Sn)	mg/kg	-	-	3.0	5.9	7.1	2.8	2.2	5.1	<2.0	10.2	4.8	2.9	1.0
	Titanium (Ti)	mg/kg	-	-	935	866	743	870	705	972	789	418	787	175	61.8
	Uranium (U)	mg/kg	-	-	6.98	5.45	6.64	7.39	4.52	6.92	7.29	1.66	5.86	1.96	0.694
	Vanadium (V)	mg/kg	-	-	59.8	51.7	53.7	64.3	49.9	62.5	61.0	24.5	53.4	12.8	4.53
	Zinc (Zn)	mg/kg	315	135	60.7	49.9	54.6	64.1	48.2	63.1	58.4	23.7	52.8	13.1	4.64
	Zirconium (Zr)	mg/kg	-	-	6.2	6.5	3.9	4.0	2.7	6.7	4.8	1.3	4.5	1.9	0.68

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Gu probable effects level (PEL; BCMOE 2015)).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013, 2014) using sediment quality guidelines, baseline sediment quality data, and method detection limits. The indicated values are specific to Camp Lake.

[shaded box] Indicates paramter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

Table D.10: Magnitude of difference in sediment metal concentrations between 2016 Camp Lake and Reference Lake 3 data, at Camp Lake between 2016 and baseline, and at Camp Lake between 2016 and 2015 for littoral and profundal substrates, Mary River Project CREMP, 2016.

Variable	Camp Lake versus Reference Lake 3 2016				Camp Lake 2016 versus Baseline Period				Camp Lake 2016 versus Initial Year of Mine Operation (2015)			
	Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations	
	Reference Lake Concentration (mg/kg)	Magnitude of Difference	Reference Lake Concentration (mg/kg)	Magnitude of Difference	Camp Lake Baseline Concentration (mg/kg)	Magnitude of Difference	Camp Lake Baseline Concentration (mg/kg)	Magnitude of Difference	Camp Lake 2015 Concentration (mg/kg)	Magnitude of Difference	Camp Lake 2015 Concentration (mg/kg)	Magnitude of Difference
Aluminum (Al)	16,480	0.8	25,150	0.8	18,267	0.7	15,175	1.2	15,900	0.8	15,430	1.2
Antimony (Sb)	<0.10	1.1	0.12	0.8	1.0	0.1	1.0	0.1	0.1	1.1	0.1	1.0
Arsenic (As)	3.7	2.3	6.5	1.4	2.8	3.1	3.5	2.6	14.6	0.6	6.6	1.4
Barium (Ba)	112	1.1	162	0.8	105	1.2	68	1.9	174	0.7	99	1.3
Beryllium (Be)	0.7	1.1	1.0	1.0	1.0	0.8	1.0	1.0	0.8	0.9	0.9	1.2
Bismuth (Bi)	<0.20	1.5	0.21	1.6	-	-	-	-	0.3	1.0	0.3	1.1
Boron (B)	13.0	1.6	19.2	1.5	1	28.5	2	15.2	24	0.9	23	1.2
Cadmium (Cd)	0.1	1.4	0.2	1.0	0.5	0.4	0.5	0.4	0.4	0.6	0.2	1.1
Calcium (Ca)	5,128	0.9	6,111	0.7	3,130	1.4	2,857	1.6	6,310	0.7	5,759	0.8
Chromium (Cr)	55	1.0	80	1.0	81	0.7	71	1.1	73	0.8	67	1.1
Cobalt (Co)	10	1.7	18	1.1	18	0.9	17	1.2	22	0.8	17	1.2
Copper (Cu)	66	0.6	101	0.5	45	0.8	40	1.3	57	0.7	39	1.3
Iron (Fe)	29,840	1.6	53,580	1.2	36,133	1.3	33,206	1.9	62,300	0.8	44,161	1.4
Lead (Pb)	46	0.4	30	0.8	18	1.1	19	1.3	21	0.9	20	1.2
Lithium (Li)	27	0.9	42	0.8	-	-	-	-	28.1	0.9	28.4	1.2
Magnesium (Mg)	10,852	1.0	16,160	0.8	13,967	0.8	10,113	1.3	13,600	0.8	12,638	1.1
Manganese (Mn)	496	5.2	1,866	1.2	699	3.7	942	2.4	1,900	1.4	2,476	0.9
Mercury (Hg)	0.0355	1.0	0.0699	0.8	0.100	0.4	0.100	0.6	0.058	0.6	0.036	1.6
Molybdenum (Mo)	2.190	1.2	3.270	0.5	1.0	2.6	1.0	1.8	2.6	1.0	1.8	1.0
Nickel (Ni)	39	1.7	56	1.2	67	1.0	63	1.1	84	0.8	62	1.1
Phosphorus (P)	840	1.8	1,121	1.9	800	1.9	1,125	1.9	1750.0	0.9	1,471	1.5
Potassium (K)	3,894	0.9	5,891	0.8	3,450	1.0	3,771	1.3	4,090	0.8	4,010	1.2
Selenium (Se)	0.5	0.8	0.9	0.6	1.0	0.4	1.0	0.5	0.6	0.7	0.4	1.5
Silver (Ag)	0.1	0.9	0.3	0.6	0.3	0.4	0.3	0.4	0.2	0.7	0.1	1.1
Sodium (Na)	296	0.5	455	0.6	279	0.5	254	1.1	184	0.8	193	1.4
Strontium (Sr)	11.4	0.8	15.8	1.0	9.3	1.0	12.0	1.3	11.1	0.8	13.4	1.1
Sulphur (S)	<5,000	1.0	<5,000	1.0	-	-	-	-	5000.0	1.0	5000.0	1.0
Thallium (Tl)	0.388	1.2	0.801	0.6	1.0	0.5	1.0	0.5	0.7	0.7	0.5	1.0
Tin (Sn)	56	0.1	16	0.2	-	-	-	-	2.0	2.8	2.0	1.7
Titanium (Ti)	1,072	0.7	1,331	0.7	-	-	-	-	893.0	0.8	759.9	1.2
Uranium (U)	12	0.4	27	0.3	-	-	-	-	9.7	0.5	5.7	1.3
Vanadium (V)	50	1.0	72	0.9	69	0.7	57	1.1	61	0.8	53	1.2
Zinc (Zn)	74	0.6	105	0.6	67	0.7	57	1.1	61	0.8	52	1.2
Zirconium (Zr)	4.3	0.9	4.0	1.3	-	-	-	-	8	0.5	5	1.0

Denotes slight elevation (mean variable concentration 2 to 5 times higher than respective mean reference, baseline period 0r 2015 value).

Denotes moderate elevation (mean variable concentration 5 to 10 times higher than respective mean reference, baseline period, or 2015 value).

Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference, baseline period or 2015 value).

Table D.11: Field observations at Sheardown Lake Northwest (DLO-01) benthic invertebrate community stations [a], Mary River Project CREMP, August 2016.

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algal Presence
DD-HAB-9-STN2	10.3	thin "rust" layer at surface (~0.3cm thick) over medium brown silt	none detected	moss or *Chara* sp. (common); globular algae (sparse)
DLO-01-8	11.4	very thin oxidized layer at surface (<0.2cm thick) over medium brown silt	none detected	none observed
DLO-01-9	7.5	thin layer of oxidized material (0.25cm thick) over dark brown silt	Yes (slight sulphur odour)	globular algae (sparse)
DLO-01-3	8.6	thin layer of oxidized material (0.25cm thick) over dark brown silt	Yes (slight sulphur odour, blackened substrate)	globular algae (sparse)
DLO-01-10	9.0	reddish-orange coloured oxidized material (~0.5cm thick) over medium brown silt	none detected	none observed

[a] Sediment particle size and benthic invertebrate community samples were collected by petite-Ponar.

[b] Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

Table D.12: Sediment core observations from cores collected at littoral stations in Sheardown Lake Northwest (DLO-01), Mary River Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
DD-HAB 9-STN2	10.3	1	17.0	0 to 3	dark orange-brown to black organic-silt floc mixture
				3 to 17	dark to medium brown silt
		2	19.5	0 to 2.5	dark orange brown oxidized floc
				2.5 to 9	dark orange brown to black organic silt floc mix
				9 to 19.5	dark to medium brown silt
		3	16.0	0 to 1	orange brown oxidized floc
				1 to 7	dark orange brown to black organic silt floc mix
				7 to 16	dark to medium brown silt
DLO-01-08	11.4	1	14.5	0 to 2.5	orange-brown (iron oxide) silt
				2.5 to 10	medium beige-coloured silt
				10 to 11	green coloured silt
				11 to 14.5	medium beige-coloured silt
		2	16.0	0 to 2	orange-brown (iron oxide) silt
				2 to 12	medium beige-coloured silt
				12 to 13	green coloured silt
				13 to 16	medium beige-coloured silt
		3	14.5	0 to 3	orange-brown (iron oxide) silt
				3 to 10	medium beige-coloured silt
				10 to 11	green coloured silt
				11 to 14.5	medium beige-coloured silt
DLO-01-3	7.8	1	13.5	0 to 0.5	orange brown (iron oxide) silt, moss present
				0.5 to 6	gray black reducing zone, silt
				6 to 13.5	medium brown silt
		2	16.0	0 to 0.5	orange brown (iron oxide) silt, moss present
				0.5 to 6.5	gray black reducing zone, silt
				6.5 to 16	medium brown silt
		3	14.0	0 to 2	orange brown (iron oxide) silt, moss present
				2 to 14	medium brown silt
DLO-01-9	7.5	1	21.0	0 to 2	iron oxide / macrophyte (moss) mix
				2 to 10	medium brown organic silt
				10 to 21	medium brown silt
		2	18.0	0 to 1	iron oxide / macrophyte (moss) mix
				1 to 7	medium brown organic silt
				7 to 18	medium brown silt
		3	22.0	0 to 2.5	iron oxide / macrophyte (moss) mix
				2.5 to 7	medium brown organic silt
				7 to 22	medium brown silt
DLO-01-10	9.4	1	15.0	0 to 1	orange brown oxidized silt
				1 to 4	medium brown organic silt
				4 to 15	medium brown silt
		2	15.0	0 to 2	orange brown oxidized silt
				2 to 15	medium brown silt
		3	14.5	0 to 2	orange brown oxidized silt
				2 to 14.5	medium brown silt

Table D.13: Sediment core observations from cores collected at profundal stations in Sheardown Lake Northwest (DLO-01), Mary River Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
DLO-01-05	23.1	1	13.0	0 to 0.5	orange brown oxidized silt
				0.5 to 4.5	dark brown silt with black streaking
				4.5 to 13	medium brown silt
		2	13.0	0 to 0.5	orange brown oxidized silt
				0.5 to 5	dark brown silt with black streaking
				5 to 13	medium brown silt
		3	22.0	0 to 0.5	orange brown oxidized silt
				0.5 to 4.5	dark brown silt with black streaking
				4 to 22	medium brown silt
DLO-01	20.3	1	14.0	0 to 0.5	oxidized orange brown silt
				0.5 to 14	uniform orange brown silt
		2	15.0	0 to 0.5	oxidized orange brown silt
				0.5 to 15	uniform orange brown silt
		3	11.5	0 to 11.5	uniform orange brown silt, some oxidation at surface
DLO-01-2	18.6	1	18.0	0 to 18	uniform orange brown silt
		2	14.5	0 to 14.5	uniform orange brown silt
		3	13.5	0 to 13.5	uniform orange brown silt
DLO-DUP (replicate of DLO-01-2)	-	1	14.5	0 to 3	orange brown oxidized silt
				3 to 5	black to orange colouorange oxidized silt
				5 to 14.5	light brown silt
		2	14.0	0 to 14.5	orange brown oxidized silt
		3	16.5	0 to 16.5	orange brown oxidized silt

Table D.14: Statistical comparison of littoral station substrate physical properties between Sheardown Lake NW and Reference Lake 3, Mary River Project CREMP, August 2016.

Habitat Variable	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Station Type	n	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Sand (% by weight)	No	0.601	α, δ, γ	Reference	5	42.5	18.1	8.1	19.9	66.6
				Sheardown NW	5	36.4	17.6	7.9	12.7	53.4
Silt (% by weight)	No	0.769	α, δ, γ	Reference	5	53.1	16.3	7.3	31.1	74.0
				Sheardown NW	5	56.3	17.2	7.7	39.1	79.0
Clay (% by weight)	Yes	0.041	ε, δ, γ	Reference	5	4.4	2.2	1.0	2.3	7.4
				Sheardown NW	5	7.3	0.6	0.3	6.6	8.3
Moisture (%)	Yes	0.039	α, δ, γ	Reference	5	89.7	13.4	6.0	66.6	99.0
				Sheardown NW	5	70.4	11.3	5.0	58.1	86.6
TOC (%)	Yes	0.056	γ	Reference	5	4.8	2.0	0.9	3.3	8.0
				Sheardown NW	5	2.9	1.3	0.6	2.0	5.1

[a] Data analysis included: α - data untransformed; β - data logit transformed; η - $\log_{10}$ transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table D.15: Sediment particle size, total organic carbon, metal concentrations at Sheardown Lake Northwest (DLO-01) sediment stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Sheardown Lake Northwest Stations								Study Area Summary Statistics		
					DLO-01-5 (profundal)	DD-HAB 9-STN2 (littoral)	DLO-01-8 (littoral)	DLO-01 (profundal)	DLO-01-9 (littoral)	DLO-01-2 (profundal)	DLO-01-3 (littoral)	DLO-01-10 (littoral)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	16.2	12.7	22.9	11.5	48.7	23.4	44.2	53.4	29	17	6.0
	Silt	%	-	-	69.8	79.0	69.8	68.7	44.3	69.4	49.2	39.1	61	15	5.2
	Clay	%	-	-	14.0	8.3	7.3	19.8	7.0	7.3	6.6	7.5	10	4.7	1.7
	Moisture	%	-	-	56.1	69.4	86.6	55.3	75.6	63.7	58.1	62.2	66	11	3.8
	Total Organic Carbon	%	10^{α}	-	2.19	2.90	2.04	1.70	5.12	1.92	2.23	2.03	2.52	1.11	0.392
Metals	Aluminum (Al)	mg/kg	-	-	21,300	13,600	18,100	23,800	19,500	18,550	12,900	14,000	17,719	3,925	1,388
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.10	0	0
	Arsenic (As)	mg/kg	17	6.2	3.74	***13.8***	6.13	4.93	***7.54***	4.23	2.52	***9.77***	***6.58***	3.71	1.31
	Barium (Ba)	mg/kg	-	-	91.2	621	92.6	103	110	108.2	61.8	93.6	160	186.8	66.0
	Beryllium (Be)	mg/kg	-	-	1.14	0.72	0.97	1.24	1.03	0.95	0.67	0.73	0.931	0.208	0.074
	Bismuth (Bi)	mg/kg	-	-	0.32	0.27	0.21	0.27	0.28	0.23	<0.20	<0.20	0.25	0.044	0.016
	Boron (B)	mg/kg	-	-	31.2	20.2	28.4	33.9	31.9	27.0	19.5	20.2	26.5	5.83	2.06
	Cadmium (Cd)	mg/kg	3.5	1.5	0.259	0.306	0.172	0.271	0.481	0.241	0.208	0.166	0.263	0.100	0.0355
	Calcium (Ca)	mg/kg	-	-	4,130	4,360	3,960	4,630	6,180	4,445	3,920	4,050	4,459	738	261.0
	Chromium (Cr)	mg/kg	90	97	79.8	52.4	67.3	83.8	77.2	70.7	54.4	58.2	68.0	12.0	4.24
	Cobalt (Co)	mg/kg	-	-	14.9	12.6	14.3	17.2	14.5	15.4	9.90	12.2	13.9	2.24	0.79
	Copper (Cu)	mg/kg	197	58	49.8	38.6	38.9	50.1	***71.0***	40.1	34.9	31.1	44.3	12.64	4.47
	Iron (Fe)	mg/kg	$40,000^{\alpha}$	52,200	43,400	***83,000***	***60,700***	41,200	***65,400***	36,400	24,700	***59,900***	51,838	18,738	6,625
	Lead (Pb)	mg/kg	91.3	35	25.3	20.2	24.0	29.8	22.5	***37.8***	16.0	16.2	24.0	7.23	2.56
	Lithium (Li)	mg/kg	-	-	41.9	22.8	30.1	41.3	35.8	34.0	23.9	25.1	31.9	7.6	2.69
	Magnesium (Mg)	mg/kg	-	-	14,100	9,480	11,200	14,400	13,800	12,050	10,100	9,900	11,879	2,011	711
	Manganese (Mn)	mg/kg	$1,100^{\alpha,\beta}$	4,530	376	***10,300***	873	1,120	437	2,810	244	663	2,103	3,411	1,206
	Mercury (Hg)	mg/kg	0.486	0.17	0.0587	0.0418	0.0315	0.0367	0.0592	0.0342	0.0277	0.0322	0.0402	0.0123	0.00433
	Molybdenum (Mo)	mg/kg	-	-	1.40	19.7	8.87	1.82	7.49	5.76	2.29	5.67	6.62	5.95	2.10
	Nickel (Ni)	mg/kg	$75^{\alpha,\beta}$	77	66.0	66.3	60.6	68.5	***90.5***	69.0	55.5	56.3	66.6	11.0	3.89
	Phosphorus (P)	mg/kg	$2,000^{\alpha}$	1,958	909	***2,310***	1,050	929	1,030	835	780	1,880	1,215	562	199
	Potassium (K)	mg/kg	-	-	5,380	3,340	4,380	5,750	4,720	4,635	3,170	3,420	4,349	965	341
	Selenium (Se)	mg/kg	-	-	0.50	0.41	0.39	0.34	0.68	0.35	0.27	0.35	0.41	0.13	0.045
	Silver (Ag)	mg/kg	-	-	0.22	0.12	0.12	0.19	0.18	0.13	<0.10	<0.10	0.15	0.045	0.016
	Sodium (Na)	mg/kg	-	-	316	186	250	316	297	272	224	196	257	51.6	18.3
	Strontium (Sr)	mg/kg	-	-	12.3	9.17	10.1	13.2	12.1	11.1	9.43	9.24	10.8	1.57	0.55
	Sulphur (S)	mg/kg	-	-	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	5000	0	0
	Thallium (Tl)	mg/kg	-	-	0.546	0.446	0.456	0.633	0.610	0.569	0.375	0.351	0.498	0.106	0.0376
	Tin (Sn)	mg/kg	-	-	2.4	4.7	9.3	10.8	2.1	26.2	3.5	3.2	7.8	8.1	2.9
	Titanium (Ti)	mg/kg	-	-	1,280	773	1,050	1,350	1,160	1,140	973	884	1,076	196	69
	Uranium (U)	mg/kg	-	-	9.35	7.88	5.29	9.23	15.0	6.29	6.82	5.82	8.21	3.13	1.11
	Vanadium (V)	mg/kg	-	-	59.2	39.8	52.3	65.3	59.0	54.2	39.2	42.4	51.4	9.9	3.50
	Zinc (Zn)	mg/kg	315	123	75.1	51.8	61.8	78.8	72.7	65.2	47.2	49.4	62.7	12.3	4.34
	Zirconium (Zr)	mg/kg	-	-	14.9	5.9	6.7	8.3	20.7	4.9	8.7	6.4	9.6	5.45	1.93

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2015)).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013, 2014) using sediment quality guidelines, baseline sediment quality data, and method detection limits. The indicated values are specific to Sheardown Lake Northwest.

(shaded box) Indicates paramter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

Table D.16: Magnitude of difference in sediment metal concentrations between Sheardown Lake NW and Reference Lake 3 in 2016, at Sheardown Lake NW between 2016 and the baseline period, and at Sheardown Lake NW between 2015 and 2016 mine operation years for littoral and profundal stations, Mary River Project CREMP, 2016

Variable	Sheardown Lake NW versus Reference Lake 3 in 2016				Sheardown Lake NW 2016 versus Baseline Period				Sheardown Lake NW 2016 versus Initial Year of Mine Operation (2015)			
	Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations	
	Reference Lake Concentration (mg/kg)	Magnitude of Difference	Reference Lake Concentration (mg/kg)	Magnitude of Difference	Sheardown Lake NW Baseline Concentration (mg/kg)	Magnitude of Difference	Sheardown Lake NW Baseline Concentration (mg/kg)	Magnitude of Difference	Sheardown Lake NW 2015 Concentration (mg/kg)	Magnitude of Difference	Sheardown Lake NW 2015 Concentration (mg/kg)	Magnitude of Difference
Aluminum (Al)	16,480	0.9	25,150	0.8	11,792	1.3	17,745	1.2	15,205	1.0	21,000	1.0
Antimony (Sb)	<0.10	1.0	0.12	0.8	1.0	0.1	1.0	0.1	0.1	1.0	0.1	1.0
Arsenic (As)	3.7	2.1	6.5	0.7	3.0	2.7	3.2	1.3	6.9	1.2	5.1	0.8
Barium (Ba)	112	1.8	162	0.6	78	2.5	93	1.1	140	1.4	100	1.0
Beryllium (Be)	0.7	1.2	1.0	1.1	1.0	0.8	1.0	1.1	0.8	1.0	1.1	1.0
Bismuth (Bi)	<0.20	1.2	0.21	1.3	-	-	-	-	0.3	-	0.3	-
Boron (B)	13.0	1.8	19.2	1.6	3	8.4	3	9.9	25	0.9	32	1.0
Cadmium (Cd)	0.1	1.8	0.2	1.4	0.5	0.5	0.5	0.5	0.4	0.8	0.3	1.0
Calcium (Ca)	5,128	0.9	6,111	0.7	2,697	1.7	3,558	1.2	4,411	1.0	4,595	1.0
Chromium (Cr)	55	1.1	80	1.0	53	1.2	81	1.0	60	1.0	81	1.0
Cobalt (Co)	10	1.3	18	0.9	10	1.2	15	1.0	14	0.9	17	0.9
Copper (Cu)	66	0.6	101	0.5	33	1.3	48	1.0	45	1.0	47	1.0
Iron (Fe)	29,840	2.0	53,580	0.8	28,120	2.1	40,382	1.0	57,810	1.0	43,375	0.9
Lead (Pb)	46	0.4	30	1.0	13	1.6	20	1.5	19	1.1	24	1.3
Lithium (Li)	27	1.0	42	0.9	-	-	-	-	26.6	-	36.2	-
Magnesium (Mg)	10,852	1.0	16,160	0.8	7,448	1.5	11,498	1.2	10,250	1.1	13,750	1.0
Manganese (Mn)	496	5.1	1,866	0.8	756	3.3	2,164	0.7	1,496	1.7	2,707	0.5
Mercury (Hg)	0.0355	1.1	0.0699	0.6	0.100	0.4	0.100	0.4	0.039	1.0	0.041	1.1
Molybdenum (Mo)	2.190	4.0	3.270	0.9	3.4	2.6	3.5	0.8	9.6	0.9	3.8	0.8
Nickel (Ni)	39	1.7	56	1.2	49	1.3	69	1.0	70	0.9	70	1.0
Phosphorus (P)	840	1.7	1,121	0.8	863	1.6	1,400	0.6	1020.3	-	1006.8	-
Potassium (K)	3,894	1.0	5,891	0.9	2,681	1.4	4,612	1.1	3,889	1.0	5,458	1.0
Selenium (Se)	0.5	0.9	0.9	0.5	1.0	0.4	1.0	0.4	0.5	0.8	0.4	1.0
Silver (Ag)	0.1	1.1	0.3	0.7	0.3	0.5	0.3	0.6	0.2	0.7	0.2	0.9
Sodium (Na)	296	0.8	455	0.7	249	0.9	342	0.9	233	1.0	306	1.0
Strontium (Sr)	11.4	0.9	15.8	0.8	7.2	1.4	11.4	1.1	10.7	0.9	13.0	0.9
Sulphur (S)	<5,000	1.0	<5,000	1.0	-	-	-	-	5000.0	-	5000.0	-
Thallium (Tl)	0.388	1.2	0.801	0.7	1.0	0.4	1.0	0.6	0.5	0.8	0.7	0.9
Tin (Sn)	56	0.1	16	0.8	-	-	-	-	2.0	-	2.0	-
Titanium (Ti)	1,072	0.9	1,331	0.9	-	-	-	-	889.3	-	1235.0	-
Uranium (U)	12	0.7	27	0.3	-	-	-	-	8.9	-	9.2	-
Vanadium (V)	50	0.9	72	0.8	37	1.2	58	1.0	47	1.0	61	1.0
Zinc (Zn)	74	0.8	105	0.7	51	1.1	76	1.0	59	1.0	76	1.0
Zirconium (Zr)	4.3	2.2	4.0	2.3	-	-	-	-	10.9875	-	9.675	-

Denotes slight elevation (mean variable concentration 2 to 5 times higher than respective mean reference, baseline, or 2015 value).
Denotes moderate elevation (mean variable concentration 5 to 10 times higher than respective mean reference, baseline period, or 2015 value).
Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference, baseline period or 2015 value).

Table D.17: Field observations at Sheardown Lake Southeast (DLO-02) benthic invertebrate community stations [a], Mary River Project CREMP, August 2016.

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algal Presence
DLO-02-1	11.3	dark brown silt (compact)	none detected	globular algae (sparse)
DLO-02-11	6.7	moderately loose silt / organic silt, dark browk to black, some iron oxide flecking on surface	Yes (slight sulphur/chemical odour)	moss (very sparse), globular algae (common)
DLO-02-9	8.2	dark to medium brown compact silt, possible 0.1cm oxidized layer (reddish 6mm)	none detected	moss (sparse), globular algae (sparse)
DLO-02-13	12.0	dark brown compact to semi-compact silt	none detected	none observed
DLO-02-3	13.9	dark brown, compact silt	none detected	moss (sparse)

[a] Sediment particle size and benthic invertebrate community samples were collected by petite-Ponar.

[b] Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

Table D.18: Sediment core observations from cores collected in Sheardown Lake Southeast basin (DLO-02), Mary River Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
DLO-02-1	11.3	1	26.0	0 to 2	orange brown oxidized silt
				2 to 7	medium brown silt
				7 to 22	medium brown-coloured silt sand mix
				22 to 26	medium brown silt
		2	9.5	0 to 1.5	orange brown oxidized silt
				1.5 to 9.5	medium brown silt
		3	7.0	0 to 2	orange brown oxidized silt
				2 to 7	medium brown silt
DLO-02-11	6.7	1	10.0	0 to 1	orange brown oxidized material over silt
				1 to 10	medium brown silt, some black streaking
		2	9.5	0 to 1	orange brown oxidized material over silt
				1 to 3	green, black, and/or brown organic silt floc-like material, possibly anoxic
				3 to 10	medium brown silt with some black streaking
		3	11.0	0 to 1	orange brown oxidized material over silt
				1 to 11	medium brown silt, some black streaking
DLO-02-9	8.2	1	10.5	0 to 1	orange brown oxidized material
				1 to 10.5	dark brown silt with black streaking
		2	8.0	0 to 2	orange brown oxidized material
				2 to 8	dark brown silt with black streaking
		3	9.5	0 to 1.5	orange brown oxidized material
				1.5 to 9.5	dark brown silt with black streaking
DLO-02-13	12	1	10.0	0 to 1.5	orange brown silt
				1.5 to 10	medium brown silt, some black streaking
		2	12.0	0 to 2	orange brown silt
				2 to 12	medium brown silt, some black streaking
		3	14.0	0 to 2	orange brown silt
				2 to 14	medium brown silt, some black streaking
DLO-02-3	13.9	1	15.5	0 to 2	orange brown silt
				2 to 15.5	medium brown silt with black streaking throughout
		2	12.5	0 to 2	orange brown silt
				2 to 12.4	medium brown silt with black streaking throughout
		3	7.0	0 to 7	orange brown and medium brown silt, some black streaking

Table D.19: Statistical comparison of substrate physical properties between littoral depth stations at Sheardown Lake SE and Reference Lake 3, Mary River Project CREMP, August 2016.

Habitat Variable	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Station Type	n	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Sand (% by weight)	Yes	0.003	β, δ, γ	Reference	5	42.5	18.1	8.1	19.9	66.6
				Sheardown SE	5	12.0	4.3	1.9	7.3	16.6
Silt (% by weight)	Yes	0.051	α, ε, γ	Reference	5	53.1	16.3	7.3	31.1	74.0
				Sheardown SE	5	73.0	3.2	1.4	70.4	78.1
Clay (% by weight)	Yes	0.000	α, δ, γ	Reference	5	4.4	2.2	1.0	2.3	7.4
				Sheardown SE	5	14.9	3.2	1.4	11.6	18.7
Moisture (%)	Yes	0.008	γ	Reference	5	89.7	13.4	6.0	66.6	99.0
				Sheardown SE	5	41.4	5.7	2.5	36.9	51.2
TOC (%)	Yes	0.015	α, ε, γ	Reference	5	4.8	2.0	0.9	3.3	8.0
				Sheardown SE	5	1.3	0.3	0.1	1.1	1.9

[a] Data analysis included: α - data untransformed; β - data logit transformed; η - $\log_{10}$ transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

[grey box] Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table D.20: Sediment particle size, total organic carbon, and metal concentrations at Sheardown Lake Southeast (DLO-02) sediment stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Sheardown Lake Southeast Stations DLO-02-1 (littoral)	DLO-02-11 (littoral)	DLO-02-9 (littoral)	DLO-02-13 (littoral)	DLO-02-3 (littoral)	Study Area Summary Statistics Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	16.3	11.4	8.4	7.3	16.6	12	4.3	1.9
	Silt	%	-	-	72.1	70.6	78.1	74.0	70.4	73	3.2	1.4
	Clay	%	-	-	11.6	18.0	13.5	18.7	12.9	15	3.2	1.4
	Moisture	%	-	-	36.9	51.2	41.3	38.6	39.0	41	5.7	2.5
	Total Organic Carbon	%	10^{α}	-	1.22	1.86	1.05	1.07	1.32	1.30	0.33	0.15
Metals	Aluminum (Al)	mg/kg	-	-	14,300	18,200	15,300	18,800	15,600	16,440	1,953	873
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0
	Arsenic (As)	mg/kg	17	5.9	2.86	5.14	4.49	5.89	3.63	4.40	1.20	0.54
	Barium (Ba)	mg/kg	-	-	66.2	85.4	90.2	143	76.4	92.2	29.8	13.34
	Beryllium (Be)	mg/kg	-	-	0.70	0.85	0.68	0.86	0.70	0.76	0.09	0.04
	Bismuth (Bi)	mg/kg	-	-	0.60	0.23	0.21	0.21	<0.20	0.29	0.17	0.08
	Boron (B)	mg/kg	-	-	17.4	23.6	20.2	24.8	21.3	21.5	2.91	1.30
	Cadmium (Cd)	mg/kg	3.5	1.5	0.092	0.114	0.098	0.121	0.091	0.103	0.0136	0.0061
	Calcium (Ca)	mg/kg	-	-	5,770	3,800	6,480	4,290	5,220	5,112	1,085	485.4
	Chromium (Cr)	mg/kg	90	79	63.7	76.1	74.8	75.1	63.7	70.7	6.4	2.9
	Cobalt (Co)	mg/kg	-	-	12.3	12.8	12.8	15.4	12.1	13.1	1.33	0.60
	Copper (Cu)	mg/kg	110	56	24.2	29.0	24.1	28.1	23.4	25.8	2.59	1.16
	Iron (Fe)	mg/kg	$40,000^{\alpha}$	34,400	33,100	***49,100***	***38,500***	***45,600***	***35,400***	***40,340***	6,794	3,038
	Lead (Pb)	mg/kg	91.3	35	16.6	34.6	18.3	20.9	18.1	21.7	7.4	3.3
	Lithium (Li)	mg/kg	-	-	26.5	34.8	28.4	34.6	27.8	30.4	4.0	1.8
	Magnesium (Mg)	mg/kg	-	-	12,100	12,800	13,500	13,100	12,100	12,720	618	276
	Manganese (Mn)	mg/kg	$1,100^{\alpha,\beta}$	657	527	435	***1,830***	***4,240***	***949***	***1,596***	1,578	706
	Mercury (Hg)	mg/kg	0.486	0.17	0.0240	0.0296	0.0188	0.0305	0.0233	0.0252	0.0048	0.0022
	Molybdenum (Mo)	mg/kg	-	-	0.80	2.40	1.23	2.57	1.27	1.65	0.78	0.350
	Nickel (Ni)	mg/kg	$75^{\alpha,\beta}$	66	52.0	57.0	61.6	60.2	48.4	55.8	5.6	2.5
	Phosphorus (P)	mg/kg	$2,000^{\alpha}$	1,278	914	1020	1060	1170	966	1,026	98	44
	Potassium (K)	mg/kg	-	-	3,340	4,450	3,570	4,550	3,630	3,908	552	247
	Selenium (Se)	mg/kg	-	-	<0.20	0.20	<0.20	<0.20	<0.20	0.20	0	0
	Silver (Ag)	mg/kg	-	-	<0.10	0.13	<0.10	0.12	0.10	0.11	0.01	0.01
	Sodium (Na)	mg/kg	-	-	219	303	250	310	255	267	38.3	17.1
	Strontium (Sr)	mg/kg	-	-	9.62	10.3	10.5	11.6	10.3	10.5	0.7	0.3
	Sulphur (S)	mg/kg	-	-	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	0	0
	Thallium (Tl)	mg/kg	-	-	0.332	0.412	0.366	0.440	0.337	0.377	0.047	0.021
	Tin (Sn)	mg/kg	-	-	4.4	30.0	5.8	5.8	6.8	10.6	10.9	4.9
	Titanium (Ti)	mg/kg	-	-	1,120	1,270	1,110	1,250	1,190	1,188	73	33
	Uranium (U)	mg/kg	-	-	4.62	6.18	4.21	5.88	4.96	5.17	0.84	0.37
	Vanadium (V)	mg/kg	-	-	43.5	52.3	44.9	52.2	45.1	47.6	4.3	1.9
	Zinc (Zn)	mg/kg	315	135	51.3	55.2	45.5	56.9	48.4	51.5	4.7	2.1
	Zirconium (Zr)	mg/kg	-	-	17.3	18.5	12.1	13.5	14.5	15.2	2.7	1.2

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2015)).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, baseline sediment quality data, and method detection limits. The indicated values are specific to Sheardown Lake Southeast.

[shaded] Indicates paramter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

Table D.21: Magnitude of difference in sediment metal concentrations between Sheardown Lake SE and Reference Lake 3 in 2016, at Sheardown Lake SE between 2016 and the baseline period, and at Sheardown Lake SE between 2016 and 2015 mine operational years for littoral and profundal stations, Mary River Project CREMP, 2016

Variable	Sheardown Lake SE versus Reference Lake 3 in 2016		Sheardown Lake SE 2016 versus Baseline Period		Sheardown Lake SE 2016 versus Initial Year of Mine Operation (2015)	
	Reference Lake Concentration (mg/kg)	Magnitude of Difference	Sheardown Lake SE Baseline Concentration (mg/kg)	Magnitude of Difference	Sheardown Lake SE 2015 Concentration (mg/kg)	Magnitude of Difference
Aluminum (Al)	16,480	1.0	14,950	1.1	18,467	0.9
Antimony (Sb)	<0.10	1.0	1.0	0.1	0.1	1.0
Arsenic (As)	3.7	1.2	1.9	2.4	4.7	0.9
Barium (Ba)	112	0.8	81	1.1	95	1.0
Beryllium (Be)	0.7	1.1	1.0	0.8	0.9	0.9
Boron (B)	13.0	1.6	3	8.6	27	0.8
Cadmium (Cd)	0.1	0.7	0.5	0.2	0.1	0.9
Calcium (Ca)	5,128	1.0	6,310	0.8	5,933	0.9
Chromium (Cr)	55	1.3	78	0.9	84	0.8
Cobalt (Co)	10	1.3	13	1.0	15	0.9
Copper (Cu)	66	0.4	30	0.9	30	0.9
Iron (Fe)	29,840	1.4	32,284	1.2	44,300	0.9
Lead (Pb)	46	0.5	17	1.3	19	1.1
Lithium (Li)	27	1.1	-	-	32.7	0.9
Magnesium (Mg)	10,852	1.2	12,634	1.0	14,233	0.9
Manganese (Mn)	496	3.2	462	3.5	1,048	1.5
Mercury (Hg)	0.0355	0.7	0.100	0.3	0.025	1.0
Molybdenum (Mo)	2.190	0.8	1.5	1.1	1.7	1.0
Nickel (Ni)	39	1.4	62	0.9	68	0.8
Phosphorus (P)	840	1.2	1,150	0.9	1,076	1.0
Potassium (K)	3,894	1.0	3,947	1.0	4,647	0.8
Selenium (Se)	0.5	0.4	1.0	0.2	0.2	0.9
Silver (Ag)	0.1	0.9	0.4	0.3	0.1	0.8
Sodium (Na)	296	0.9	353	0.8	299	0.9
Strontium (Sr)	11.4	0.9	16.0	0.7	13.1	0.8
Thallium (Tl)	0.388	1.0	1.0	0.4	0.5	0.8
Tin (Sn)	56	0.2	-	-	2.0	5.3
Titanium (Ti)	1,072	1.1	-	-	1,380	0.9
Uranium (U)	12	0.4	-	-	6.3	0.8
Vanadium (V)	50	1.0	52	0.9	55	0.9
Zinc (Zn)	74	0.7	51	1.0	62	0.8

Denotes slight elevation (mean variable concentration 2 to 4 times higher than respective mean reference, baseline period or 2015 value).

Denotes moderate elevation (mean variable concentration 4 to 10 times higher than respective mean reference, baseline period or 2015 value).

Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference, baseline period or 2015 value).

Table D.22: Field observations at Mary Lake (BLO) benthic invertebrate community stations[a], Mary River Project CREMP, August 2016.

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algal Presence
BLO-01	9.6	medium brown clay silt	none detected	none observed
BLO-20	11.3	brown grey fine silt with some sand	none detected	none observed
BLO-11	11.6	medium brown silt with some sand	none detected	none observed
BLO-21	11.2	medium brown silt	none detected	none observed
BLO-22	11.3	medium brown silt	none detected	none observed
BLO-06	9.1	medium brown silt	none detected	none observed

[a] Sediment particle size and benthic invertebrate community samples were collected by petite-Ponar.

[b] Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

Table D.23: Sediment observations from cores collected at littoral stations of Mary Lake (BLO), Mary River Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
BLO-01	9.6	1	17.0	0 to 2	orange brown silt
				2 to 11	medium beige silt with black streaking
				11 to 17	medium to dark brown silt
		2	27.5	0 to 2	orange brown silt
				2 to 27.5	gradient from medium beige with black streaking to dark brown silt
		3	19.0	0 to 2	orange brown silt
				2 to 19	gradient from medium beige with black streaking to dark brown silt
BLO-20	11.5	1	13.0	0 to 2	medium orange brown silt
				2 to 13	medium dark brown silt with some black streaking
		2	10.0	0 to 4	medium orange brown silt
				4 to 10	medium dark brown silt with some black streaking
		3	11.0	0 to 3	medium orange brown silt
				3 to 11	medium dark brown silt with some black streaking
BLO-11	10.9	1	15.0	0 to 1.5	orange brown silt
				1.5 to 15	orange brown silt with fine sand
		2	7.5	0 to 3	orange brown silt
				3 to 7.5	orange brown silt with fine sand
		3	13.5	0 to 2	orange brown silt
				2 to 7	orange brown silt with fine sand
				7 to 13.5	medium to dark brown silt
BLO-21	10.9	1	10.5	0 to 4	light beige silt
				4 to 10.5	medium brown silt with black streaking/band at top of layer
		2	10.5	0 to 4.5	light beige silt
				4.5 to 10.5	medium brown silt with black streaking/band at top of layer
		3	10.5	0 to 5	light beige silt
				5 to 10.5	medium brown silt with black streaking/band at top of layer
BLO-22	11.4	1	19.0	0 to 1.5	light orange brown silt
				1.5 to 8	medium beige brown silt
				8 to 19	dark brown silt with some minor black streaking
		2	20.0	0 to 2	light orange brown silt
				2 to 6	medium beige brown silt
				6 to 20	dark brown silt with some minor black streaking
		3	20.0	0 to 2	light orange brown silt
				2 to 7	medium beige brown silt
				7 to 20	dark brown silt with some minor black streaking
BLO-06	9.1	1	9.0	0 to 6	medium brown silt
				6 to 9	medium brown silt with dark brown pockets
		2	9.0	0 to 6	medium brown silt
				6 to 9	medium brown silt with dark brown pockets
		3	10.5	0 to 6.5	medium brown silt
				6.5 to 10.5	medium brown silt with dark brown pockets

Table D.24: Sediment observations from cores collected at profundal stations of Mary Lake (BLO), Mary River Project CREMP, August 2016.

Sample Station	Station Depth (m)	Core #	Core Length (cm)	Core Horizon (cm)	Core Observation
BLO-12	20.0	1	7.0	0 to 7	medium brown silt
		2	14.5	0 to 2.5	medium brown silt wth some fine sand
				2.5 to 7.5	medium dark brown silt wth some fine sand
				7.5 to 14.5	compact medium to dark brown silt wth some fine sand
		3	25.0	0 to 7	medium brown silt
				7 to 25	compact medium to dark brown silt wth some fine sand
BLO-10	17.7	1	13.0	0 to 3.5	light brown silt
				3.5 to 7	medium brown silt, some black banding/streaking
				7 to 13.5	medium to dark brown silt
		2	10.0	0 to 3	light brown silt
				3 to 9	medium brown silt, some black banding/streaking
				9 to 10	medium dark brown silt
		3	8.0	0 to 3.5	light brown silt
				3.5 to 8	medium brown silt, some black banding/streaking
BLO-08	26.3	1	18.0	0 to 3	orange brown silt
				3 to 9	medium brown silt, top of layer marked by redox band ~0.5cm thick
				9 to 18	dark brown silt
		2	17.0	0 to 3	orange brown silt
				3 to 9	medium brown silt, top of layer marked by redox band ~0.5cm thick
				9 to 17	dark brown silt
		3	12.5	0 to 3	orange brown silt
				3 to 7.5	medium brown silt, top of layer marked by redox band ~0.5cm thick
				7 to 12.5	dark brown silt

Table D.25: Statistical comparison of littoral station substrate physical properties between Mary Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

Habitat Variable	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	p-value	Statistical Analysis[a]	Station Type	n	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Sand (% by weight)	Yes	0.030	α, δ, γ	Reference	5	42.5	18.1	8.1	19.9	66.6
				Mary	6	17.7	13.9	5.7	5.1	40.4
Silt (% by weight)	No	0.228	α, δ, γ	Reference	5	53.1	16.3	7.3	31.1	74.0
				Mary	6	62.3	5.9	2.4	52.1	70.6
Clay (% by weight)	Yes	0.024	α, ε, γ	Reference	5	4.4	2.2	1.0	2.3	7.4
				Mary	6	20.0	12.1	4.9	7.5	33.4
Moisture (%)	Yes	0.001	γ	Reference	5	89.7	13.4	6.0	66.6	99.0
				Mary	6	51.0	7.8	3.2	42.0	59.7
TOC (%)	Yes	0.012	γ	Reference	5	4.8	2.0	0.9	3.3	8.0
				Mary	6	1.1	0.3	0.1	0.8	1.5

[a] Data analysis included: α - data untransformed; β - data logit transformed; η - log_{10} transformed; δ - single factor ANOVA test conducted; ε - t-test assuming unequal variance; γ - ANOVA test validated using Mann Whitney U-test.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table D.26: Sediment particle size, total organic carbon, and metal concentrations at Mary Lake (BLO) sediment stations, Mary River Project CREMP, August 2016.

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Mary Lake Stations									Study Area Summary Statistics		
					BLO-01 (littoral)	BLO-11 (littoral)	BLO-12 (profundal)	BLO-08 (profundal)	BLO-10 (profundal)	BLO-20 (littoral)	BLO-21 (littoral)	BLO-22 (littoral)	BLO-06 (littoral)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	18.7	40.4	34.6	5.1	7.5	26.6	10.0	5.6	5.1	17	14	4.6
	Silt	%	-	-	70.6	52.1	52.7	61.7	54.0	63.8	63.3	62.1	61.6	60	6	2.0
	Clay	%	-	-	10.7	7.5	12.6	33.1	38.6	9.5	26.7	32.3	33.4	23	12	4.1
	Moisture	%	-	-	55.9	42.0	41.1	67.8	53.9	43.0	47.5	57.9	59.7	52	9.2	3.1
	Total Organic Carbon	%	10^{α}	-	1.54	0.78	0.78	1.12	1.00	1.03	0.88	1.16	1.15	1.05	0.24	0.079
Metals	Aluminum (Al)	mg/kg	-	-	14,700	14,800	14,700	26,100	23,800	14,300	22,100	24,600	25,500	20,067	5,281	1,760
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0
	Arsenic (As)	mg/kg	17	5.9	5.54	2.72	2.71	4.00	3.76	2.35	3.54	4.32	3.93	3.65	0.98	0.33
	Barium (Ba)	mg/kg	-	-	87.2	60.1	57.0	103	107	60.1	94.5	119	106	88.2	23.5	7.85
	Beryllium (Be)	mg/kg	-	-	0.76	0.70	0.69	1.27	1.24	0.70	1.10	1.26	1.36	1.01	0.289	0.0963
	Bismuth (Bi)	mg/kg	-	-	<0.20	<0.20	<0.20	0.27	0.25	<0.20	0.22	0.26	0.25	0.23	0.029	0.010
	Boron (B)	mg/kg	-	-	21.6	20.1	18.7	35.4	34.5	19.8	29.3	34.0	36.5	27.8	7.61	2.54
	Cadmium (Cd)	mg/kg	3.5	1.5	0.100	0.082	0.082	0.157	0.146	0.077	0.124	0.175	0.140	0.120	0.0364	0.01213
	Calcium (Ca)	mg/kg	-	-	9,700	4,280	4,300	4,900	4,610	7,750	4,380	4,720	4,750	5,488	1,911	636.9
	Chromium (Cr)	mg/kg	90	98	61.7	63.0	60.8	93.9	87.4	61.7	81.2	87.5	87.5	76.1	13.9	4.64
	Cobalt (Co)	mg/kg	-	-	13.9	11.6	11.5	17.7	16.8	11.1	15.8	18.1	17.2	14.9	2.86	0.955
	Copper (Cu)	mg/kg	110	50	27.5	21.5	20.7	35.7	33.5	21.1	31.4	34.3	34.1	28.9	6.27	2.09
	Iron (Fe)	mg/kg	$40,000^{\alpha}$	52,400	34,400	28,600	27,800	41,700	39,700	28,600	37,600	42,000	41,950	35,817	6,115	2,038
	Lead (Pb)	mg/kg	91.3	35	16.3	15.5	17.3	27.6	29.1	14.5	24.5	25.0	***36.2***	22.9	7.46	2.49
	Lithium (Li)	mg/kg	-	-	29.9	27.7	27.2	45.7	45.9	27.3	43.2	46.3	51.5	38.3	10.0	3.34
	Magnesium (Mg)	mg/kg	-	-	14,600	11,100	11,000	16,700	16,200	12,900	15,200	16,400	16,900	14,556	2,344	781
	Manganese (Mn)	mg/kg	$1,100^{\alpha,\beta}$	4,370	1,790	1,190	1,190	1,220	731	469	632	***5,340***	719	1,476	1,505	502
	Mercury (Hg)	mg/kg	0.486	0.17	0.0275	0.0264	0.0266	0.0665	0.0617	0.0185	0.0450	0.0598	0.0519	0.0427	0.0182	0.00607
	Molybdenum (Mo)	mg/kg	-	-	0.58	0.63	1.16	0.88	0.79	0.61	0.69	1.57	0.86	0.86	0.32	0.11
	Nickel (Ni)	mg/kg	$75^{\alpha,\beta}$	72	53.2	47.7	49.5	67.4	62.7	47.7	56.5	65.6	60.1	56.7	7.6	2.55
	Phosphorus (P)	mg/kg	$2,000^{\alpha}$	1,580	1,110	989	958	854	784	896	806	945	767	901	112	37
	Potassium (K)	mg/kg	-	-	3,400	3,430	3,400	6,440	5,790	3,270	5,350	6,190	6,365	4,848	1,435	478
	Selenium (Se)	mg/kg	-	-	<0.20	<0.20	<0.20	0.24	0.24	<0.20	<0.20	0.23	0.23	0.22	0.019	0.006
	Silver (Ag)	mg/kg	-	-	<0.10	<0.10	<0.10	0.15	0.15	<0.10	0.12	0.14	0.14	0.12	0.022	0.007
	Sodium (Na)	mg/kg	-	-	239	227	225	395	372	218	348	366	390	309	78.7	26.2
	Strontium (Sr)	mg/kg	-	-	13.8	10.3	10.0	16.1	14.5	10.9	13.4	15.2	15.3	13.3	2.31	0.769
	Sulphur (S)	mg/kg	-	-	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	0	0
	Thallium (Tl)	mg/kg	-	-	0.331	0.331	0.328	0.605	0.579	0.322	0.541	0.621	0.640	0.478	0.144	0.0481
	Tin (Sn)	mg/kg	-	-	4.1	4.1	7.3	7.1	10.6	3.1	5.0	2.0	20.4	7.1	5.630	1.877
	Titanium (Ti)	mg/kg	-	-	965	1,190	1,090	1,580	1,550	1,150	1,550	1,520	1,660	1,362	259	86
	Uranium (U)	mg/kg	-	-	3.78	5.02	5.05	10.4	10.3	5.04	8.36	9.64	10.1	7.52	2.74	0.915
	Vanadium (V)	mg/kg	-	-	46.8	44.0	42.3	68.7	65.5	42.1	63.3	66.0	69.8	56.5	12.3	4.08
	Zinc (Zn)	mg/kg	315	135	49.8	51.4	49.0	82.3	78.7	49.0	76.1	81.3	85.0	67.0	16.5	5.49
	Zirconium (Zr)	mg/kg	-	-	9.3	12.8	13.7	23.7	23.1	16.8	22.9	19.9	24.5	18.5	5.57	1.86

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2015)).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, baseline sediment quality data, and method detection limits. The indicated values are specific to Mary Lake.

(shaded) Indicates paramter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

Table D.27: Magnitude of difference in sediment metal concentrations between Mary Lake and Reference Lake 3 in 2016, at Mary Lake between 2016 and the baseline period, and at Mary Lake between 2015 and 2016 for littoral and profundal stations, Mary River Project CREMP, 2016.

Variable	Mary Lake versus Reference Lake 3 in 2016				Mary Lake 2016 versus Baseline Period				Mary Lake 2016 versus Initital Year of Mine Operation (2015)			
	Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations	
	Reference Lake Concentration (mg/kg)	Magnitude of Difference	Reference Lake Concentration (mg/kg)	Magnitude of Difference	Mary Lake Baseline Concentration (mg/kg)	Magnitude of Difference	Mary Lake Baseline Concentration (mg/kg)	Magnitude of Difference	Mary Lake 2015 Concentration (mg/kg)	Magnitude of Difference	Mary Lake 2015 Concentration (mg/kg)	Magnitude of Difference
Aluminum (Al)	16,480	1.2	25,150	0.9	18,267	1.1	17,000	1.3	21,300	0.9	24,913	0.9
Antimony (Sb)	<0.10	1.0	0.12	0.8	1.0	0.1	1.0	0.1	0.1	1.0	0.1	1.0
Arsenic (As)	3.7	1.0	6.5	0.5	2.8	1.3	3.7	0.9	4.9	0.8	5.2	0.7
Barium (Ba)	112	0.8	162	0.6	105	0.8	76	1.2	94	0.9	98	0.9
Beryllium (Be)	0.7	1.5	1.0	1.0	1.0	1.0	1.0	1.1	1.1	0.9	1.2	0.9
Bismuth (Bi)	<0.20	1.1	0.21	1.2	-	-	-	-	0.2	0.9	0.3	0.8
Boron (B)	13.0	2.1 [slight elevation]	19.2	1.5	1	36.7 [highly elevated]	2	14.1 [highly elevated]	33	0.8	36	0.8
Cadmium (Cd)	0.1	0.8	0.2	0.7	0.5	0.2	0.5	0.3	0.1	1.0	0.1	0.9
Calcium (Ca)	5,128	1.2	6,111	0.8	3,130	1.9	2,934	1.6	6,995	0.8	4,583	1.0
Chromium (Cr)	55	1.3	80	1.0	81	0.9	76	1.1	79	0.9	92	0.9
Cobalt (Co)	10	1.4	18	0.8	18	0.8	18	0.9	16	0.9	18	0.9
Copper (Cu)	66	0.4	101	0.3	45	0.6	44	0.7	31	0.9	34	0.9
Iron (Fe)	29,840	1.2	53,580	0.7	36,133	1.0	35,654	1.0	38,750	0.9	43,019	0.8
Lead (Pb)	46	0.5	30	0.8	18	1.2	21	1.2	22	1.0	25	1.0
Lithium (Li)	27	1.4	42	0.9	-	-	-	-	42.3	0.9	47.0	0.8
Magnesium (Mg)	10,852	1.3	16,160	0.9	13,967	1.0	10,903	1.3	15,750	0.9	16,063	0.9
Manganese (Mn)	496	3.4 [slight elevation]	1,866	0.6	699	2.4 [slight elevation]	991	1.1	1,222	1.4	1,681	0.6
Mercury (Hg)	0.0355	1.1	0.0699	0.7	0.100	0.4	0.100	0.5	0.035	1.1	0.050	1.0
Molybdenum (Mo)	2.190	0.4	3.270	0.3	1.0	0.8	1.0	0.9	0.8	1.1	1.0	0.9
Nickel (Ni)	39	1.4	56	1.1	67	0.8	65	0.9	58	0.9	66	0.9
Phosphorus (P)	840	1.1	1,121	0.8	800	1.1	1,325	0.7	946.5	1.0	983.5	0.9
Potassium (K)	3,894	1.2	5,891	0.9	3,450	1.4	4,287	1.2	5,400	0.9	6,237	0.8
Selenium (Se)	0.5	0.4	0.9	0.3	1.0	0.2	1.0	0.2	0.2	0.9	0.2	1.0
Silver (Ag)	0.1	1.0	0.3	0.5	0.3	0.4	0.4	0.4	0.1	0.9	0.2	0.8
Sodium (Na)	296	1.0	455	0.7	279	1.1	284	1.2	331	0.9	382	0.9
Strontium (Sr)	11.4	1.2	15.8	0.9	9.3	1.4	13.3	1.0	15.3	0.9	16.4	0.8
Sulphur (S)	<5,000	1.0	<5,000	1.0	-	-	-	-	5,000	1.0	5,000	1.0
Thallium (Tl)	0.388	1.2	0.801	0.6	1.0	0.5	1.0	0.5	0.5	0.9	0.6	0.8
Tin (Sn)	56	0.1	16	0.5	-	-	-	-	2.0	3.2 [slight elevation]	2.0	4.1 [moderate elevation]
Titanium (Ti)	1,072	1.2	1,331	1.1	-	-	-	-	1,401	1.0	1,565	0.9
Uranium (U)	12	0.6	27	0.3	-	-	-	-	7.4	0.9	9.7	0.9
Vanadium (V)	50	1.1	72	0.8	69	0.8	63	0.9	61	0.9	68	0.9
Zinc (Zn)	74	0.9	105	0.7	67	1.0	64	1.1	71	0.9	82	0.9
Zirconium (Zr)	4.3	4.1 [moderate elevation]	4.0	5.0 [moderate elevation]	-	-	-	-	18	1.0	23	0.9

Denotes slight elevation (mean variable concentration 2 to 5 times higher than respective mean reference, baseline period or 2015 value).

Denotes moderate elevation (mean variable concentration 5 to 10 times higher than respective mean reference, baseline period, or 2015 value).

Denotes highly elevated concentration (mean variable concentration greater than 10 times higher than respective mean reference, baseline period, or 2015 value).

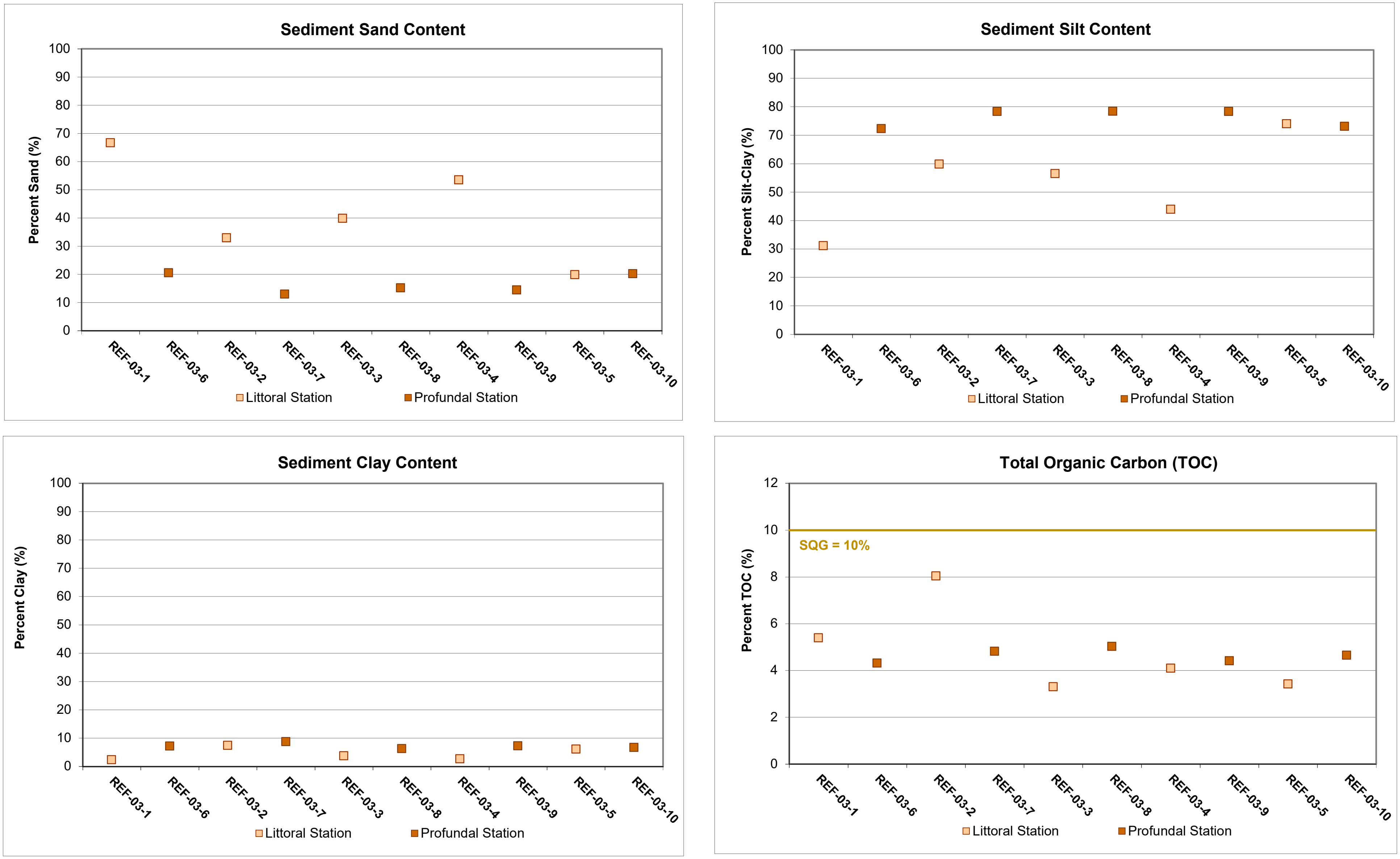


Figure D.1: Reference Lake 3 (REF-03) physical-chemical sediment quality at littoral and profundal sampling depths, Mary River Project CREMP, August 2016.

APPENDIX E

PHYTOPLANKTON DATA

Table E.1: Phytoplankton monitoring data (i.e., chlorophyll a and phaeophytin a concentrations) collected at lotic reference stations, the Camp Lake tributaries, Sheardown Lake Tributary 1 and the Tom River, Mary River Project CREMP, 2016.

Station		Reference Creek Stations				Camp Lake Tributary 1 (CLT1)						Camp Lake Tributary 2	Camp Lake Outlet	Sheardown Lake Tributary 1 (SDLT1)		Tom River
						North Branch		Main Stem								
		CLT-REF3	CLT-REF4	MRY-REF2	MRY-REF3	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	J0-01	D1-05	D1-00	I0-01
Sample Collection Date	Spring	27-Jun-16	27-Jun-16	27-Jun-16	27-Jun-16	27-Jun-16	27-Jun-16	27-Jun-16	27-Jun-16	27-Jun-16	27-Jun-16	25-Jun-16	26-Jun-16	27-Jun-16	27-Jun-16	25-Jun-16
	Summer	24-Jul-16	24-Jul-16	25-Jul-16	25-Jul-16	20-Jul-16	19-Jul-16	19-Jul-16	19-Jul-16	20-Jul-16	20-Jul-16	20-Jul-16	20-Jul-16	19-Jul-16	19-Jul-16	20-Jul-16
	Fall	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16	20-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16
Chlorophyll a (µg/L)	Spring	0.18	0.17	0.14	0.45	0.13	0.24	0.53	0.24	0.25	0.25	0.19	0.97	0.31	0.43	0.21
	Summer	0.41	0.31	0.56	0.37	0.17	0.35	0.85	0.54	0.57	0.60	0.30	1.86	0.27	1.07	0.26
	Fall	0.41	0.28	0.18	0.35	0.13	0.21	1.20	0.36	0.36	0.37	0.19	0.66	0.26	0.22	0.19
	Average	0.33	0.25	0.29	0.39	0.14	0.27	0.86	0.38	0.39	0.41	0.23	1.16	0.28	0.57	0.22
	Standard Deviation	0.13	0.07	0.23	0.05	0.02	0.07	0.34	0.15	0.16	0.18	0.06	0.62	0.03	0.44	0.04
	Standard Error	0.08	0.04	0.13	0.03	0.01	0.04	0.19	0.09	0.09	0.10	0.04	0.36	0.02	0.26	0.02
Phaeophytin a (µg/L)	Spring	0.28	0.29	0.28	0.45	0.26	0.28	0.45	0.35	0.33	0.38	0.27	0.65	0.43	0.44	0.29
	Summer	0.43	0.37	0.54	0.39	0.29	0.39	0.59	0.48	0.46	0.44	0.30	0.79	0.32	0.60	0.32
	Fall	0.34	0.30	0.30	0.33	0.22	0.28	0.48	0.32	0.34	0.33	0.24	0.38	0.25	0.29	0.23
	Average	0.35	0.32	0.37	0.39	0.26	0.32	0.51	0.38	0.38	0.38	0.27	0.61	0.33	0.44	0.28
	Standard Deviation	0.08	0.04	0.14	0.06	0.04	0.06	0.07	0.09	0.07	0.06	0.03	0.21	0.09	0.16	0.05
	Standard Error	0.04	0.03	0.08	0.03	0.02	0.04	0.04	0.05	0.04	0.03	0.02	0.12	0.05	0.09	0.03

Table E.2: Phytoplankton monitoring data (i.e., chlorophyll a and phaeophytin a concentrations) collected at Reference Lake 3 (REF-03), Mary River Project CREMP, 2016.

	Analyte	Chlorophyll a (µg/L)						Phaeophytin a (µg/L)					
	Station	REF3-01	REF3-02	REF3-03	Average	Standard Deviation	Standard Error	REF3-01	REF3-02	REF3-03	Average	Standard Deviation	Standard Error
Sample Collection Date	Summer	16-Jul-16	28-Jul-16	28-Jul-16	-	-	-	16-Jul-16	28-Jul-16	28-Jul-16	-	-	-
	Fall	20-Aug-16	19-Aug-16	20-Aug-16	-	-	-	20-Aug-16	19-Aug-16	20-Aug-16	-	-	-
Summer	Surface	0.66	0.945	1.22	0.94	0.28	0.16	0.75	0.635	0.64	0.68	0.07	0.04
	Bottom	1.08	0.81	0.82	0.90	0.15	0.09	0.74	0.69	0.65	0.69	0.05	0.03
	Average	0.87	0.88	1.02	0.92	0.08	0.05	0.75	0.66	0.65	0.68	0.05	0.03
Fall	Surface	0.63	0.69	0.64	0.65	0.03	0.02	0.5	0.43	0.45	0.46	0.04	0.02
	Bottom	1.01	0.7	0.76	0.82	0.16	0.09	0.6	0.48	0.6	0.56	0.07	0.04
	Average	0.82	0.70	0.70	0.74	0.07	0.04	0.55	0.46	0.53	0.51	0.05	0.03

Table E.3: Phytoplankton monitoring data (i.e., chlorophyll a and phaeophytin a concentrations) collected at Camp Lake (JLO), Mary River Project CREMP, 2016.

	Analyte	Chlorophyll a (µg/L)								Phaeophytin a (µg/L)							
	Station	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	Average	Standard Deviation	Standard Error	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	23-Apr-16	23-Apr-16	23-Apr-16	25-Apr-16	25-Apr-16	-	-	-	23-Apr-16	23-Apr-16	23-Apr-16	25-Apr-16	25-Apr-16	-	-	-
	Summer	24-Jul-16	24-Jul-16	24-Jul-16	26-Jul-16	26-Jul-16	-	-	-	24-Jul-16	24-Jul-16	24-Jul-16	26-Jul-16	26-Jul-16	-	-	-
	Fall	22-Aug-16	22-Aug-16	22-Aug-16	22-Aug-16	22-Aug-16	-	-	-	22-Aug-16	22-Aug-16	22-Aug-16	22-Aug-16	22-Aug-16	-	-	-
Winter	Surface	0.63	0.56	1.01	1.21	0.55	0.79	0.30	0.13	<0.39	<0.39	<0.39	0.45	<0.39	0.40	0.03	0.01
	Bottom	0.83	0.86	0.26	0.22	0.33	0.50	0.32	0.14	<0.39	<0.39	<0.39	<0.39	<0.39	0.39	0	0
	Average	0.73	0.71	0.64	0.72	0.44	0.65	0.12	0.05	0.39	0.39	0.39	0.42	0.39	0.40	0.01	0.01
Summer	Surface	1.42	1.28	1.46	1.14	1.21	1.30	0.14	0.06	0.61	0.58	0.56	0.70	0.59	0.61	0.05	0.02
	Bottom	2.32	1.52	2.16	1.20	1.32	1.70	0.51	0.23	0.62	0.61	0.69	0.80	0.87	0.72	0.11	0.05
	Average	1.87	1.40	1.81	1.17	1.27	1.50	0.32	0.14	0.62	0.60	0.63	0.75	0.73	0.66	0.07	0.03
Fall	Surface	0.67	0.68	0.66	0.63	0.70	0.67	0.03	0.01	0.48	0.42	0.41	0.44	0.46	0.44	0.03	0.01
	Bottom	1.15	0.89	1.70	2.01	1.54	1.46	0.44	0.20	0.71	0.56	0.85	0.76	0.77	0.73	0.11	0.05
	Average	0.91	0.79	1.18	1.32	1.12	1.06	0.21	0.10	0.60	0.49	0.63	0.60	0.62	0.59	0.05	0.02

Table E.4: Statistical comparisons of chlorophyll a concentrations among winter, spring, summer and/or fall sampling events at mine-exposed and reference creek and lake study areas, Mary River Project CREMP, 2016.

Study Lake	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Seasons?	p-value	Statistical Test[b]	(I) Area	(J) Area	Significant Difference Between 2 Seasons?	p-value	Statistical Test
Reference Creek Stations	NO	0.11231	ANOVA[c]	Spring	Summer	NO	0.0958	Tukey's[c]
				Spring	Fall	NO	0.4767	
				Summer	Fall	NO	0.5030	
Mary River GO-09 Reference Stations	NO	0.51119	ANOVA[c]	Spring	Summer	NO	0.9173	Tukey's[c]
				Spring	Fall	NO	0.7138	
				Summer	Fall	NO	0.4935	
Reference Lake 3	-	-	-	Winter	Summer	not applicable	-	ANOVA[c]
				Winter	Fall	not applicable	-	
				Summer	Fall	YES	0.0406	
Camp Lake	YES	0.00014	ANOVA[d,e]	Winter	Summer	YES	0.0001	Tukey's[f]
				Winter	Fall	YES	0.0074	
				Summer	Fall	YES	0.0571	
Sheardown Lake NW	YES	0.00001	ANOVA[c]	Winter	Summer	YES	0.0000	Tukey's[c]
				Winter	Fall	YES	0.0008	
				Summer	Fall	YES	0.0524	
Sheardown Lake SE	YES	0.00576	ANOVA[c]	Winter	Summer	NO	0.4522	Tukey's[c]
				Winter	Fall	YES	0.0464	
				Summer	Fall	YES	0.0050	
Mary Lake North Basin	YES	0.00001	ANOVA[c]	Winter	Summer	YES	0.0000	Tukey's[c]
				Winter	Fall	YES	0.0000	
				Summer	Fall	NO	0.2408	
Mary Lake South Basin	YES	0.00001	ANOVA	Winter	Summer	YES	0.0000	Tukey's
				Winter	Fall	YES	0.0017	
				Summer	Fall	YES	0.0195	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.
[b] Statistical tests include Analysis of Variance (ANOVA) and Kruskal Wallis H-test (KW H-test).
[c] Logged data normally distributed.
[d] Logged data non-normally distributed.
[e] Kruskal-Wallis H-test used to validate results of ANOVA three-group comparison.
[f] Mann-Whitney U-test used to validate results of post-hoc tests for all pair-wise comparisons.

Table E.5: Summary data and statistical comparison of chlorophyll a concentrations (mg/L) between individual mine-exposed lakes and Reference Lake 3 for summer sampling, Mary River Project CREMP, July 2016.

Study Lake	Comparison to Reference				Number of Stations (n)	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
	Significant Difference between Areas?	p-value	Statistical Test	Magnitude of Difference					Lower Bound	Upper Bound		
Reference Lake 03	-	-	-	-	3	0.92	0.08	0.05	0.71	1.13	0.87	1.02
Camp Lake	YES	0.0115	β	6.9	5	1.50	0.32	0.14	1.11	1.90	1.17	1.87
Sheardown Lake NW	YES	0.0002	β	14.3	6	2.13	0.39	0.16	1.73	2.54	1.58	2.65
Sheardown Lake SE	YES	0.0019	β	6.9	5	1.51	0.21	0.09	1.25	1.77	1.29	1.70
Mary Lake North	YES	0.0028	β	22.9	3	2.86	0.99	0.57	0.39	5.33	2.07	3.98
Mary Lake South	NO	0.2051	β	-	7	1.08	0.17	0.06	0.92	1.23	0.78	1.32

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Mann-Whitney U-test; δ - data exhibit unequal variance; test results validated using t-test assuming unequal variance

[b] Magnitude calculated by comparing the difference between the reference area and mine-exposed area means divided by the reference area standard deviation.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table E.6: Summary data and statistical comparison of chlorophyll a concentrations (mg/L) between individual mine-exposed lakes and Reference Lake 3 for fall sampling, Mary River Project CREMP, August 2016.

Study Lake	Comparison to Reference				Number of Stations (n)	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
	Significant Difference between Areas?	p-value	Statistical Test	Magnitude of Difference					Lower Bound	Upper Bound		
Reference Lake 03	-	-	-	-	3	0.74	0.07	0.04	0.56	0.91	0.70	0.82
Camp Lake	YES	0.0367	β	4.6	5	1.06	0.21	0.10	0.80	1.33	0.79	1.32
Sheardown Lake NW	YES	0.0000	β	11.1	6	1.53	0.18	0.07	1.33	1.72	1.30	1.80
Sheardown Lake SE	YES	0.0001	β	30.1	5	2.87	0.74	0.33	1.95	3.78	2.07	3.98
Mary Lake North	YES	0.0170	β	3.7	3	1.00	0.09	0.05	0.77	1.22	0.90	1.07
Mary Lake South	NO	0.9080	β	-	7	0.75	0.23	0.09	0.54	0.97	0.40	1.06

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Mann-Whitney U-test; δ - data exhibit unequal variance; test results validated using t-test assuming unequal variance

[b] Magnitude calculated by comparing the difference between the reference area and mine-exposed area means divided by the reference area standard deviation.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table E.7: Statistical comparisons of chlorophyll a concentrations among years of mine construction (2014) and operation (2015, 2016) at mine-exposed Camp Lake for the Mary River Project CREMP.

Season	Overall 3-group Comparison			Summary		Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test[b]	Year	Mean Concentration (mg/L)	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Winter	YES	0.00061	β , γ	2014	0.28	2014	2015	YES	0.0012	Tukey's (β , γ)
				2015	0.74	2014	2016	YES	0.0061	
				2016	0.65	2015	2016	NO	0.5455	
Summer	NO	0.21920	β , γ	2014	1.05	2014	2015	NO	0.9540	Tamhane's (β , γ)
				2015	1.26	2014	2016	NO	0.9257	
				2016	1.50	2015	2016	NO	0.4502	
Fall	YES	0.01762	α , γ	2014	1.59	2014	2015	NO	0.1262	Tamhane's (β)
				2015	0.65	2014	2016	NO	0.4558	
				2016	1.06	2015	2016	YES	0.0299	
Annual	NO	0.25654	β , γ	2014	1.01	2014	2015	NO	0.8452	Tamhane's (β , γ)
				2015	0.88	2014	2016	NO	0.5511	
				2016	1.07	2015	2016	NO	0.5364	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Kruskal-Wallis H-test (multiple group comparison) or Mann-Whitney U-test (pair-wise comparison), as appropriate.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table E.8: Phytoplankton monitoring data (i.e., chlorophyll a and phaeophytin a concentrations) collected at Sheardown Lake Northwest (DLO-01), Mary River Project CREMP, 2016.

	Analyte	**Chlorophyll a (µg/L)**								
	Station	**DD-HAB 9-STN1**	**DL0-01-5**	**DL0-01-1**	**DL0-01-4**	**DL0-01-2**	**DL0-01-7**	**Average**	**Standard Deviation**	**Standard Error**
Sample Collection Date	Winter	30-Apr-16	26-Apr-16	26-Apr-16	26-Apr-16	26-Apr-16	30-Apr-16	-	-	-
	Summer	24-Jul-16	26-Jul-16	24-Jul-16	25-Jul-16	24-Jul-16	25-Jul-16	-	-	-
	Fall	21-Aug-16	21-Aug-16	21-Aug-16	22-Aug-16	22-Aug-16	22-Aug-16	-	-	-
Winter	Surface	0.73	0.76	0.88	0.53	0.51	1.66	0.85	0.42	0.17
	Bottom	1.08	0.63	0.66	0.72	1.01	1.32	0.90	0.28	0.11
	Average	0.91	0.70	0.77	0.63	0.76	1.49	0.87	0.32	0.13
Summer	Surface	1.99	1.68	2.28	1.99	2.28	2.37	2.10	0.26	0.11
	Bottom	1.71	1.48	1.84	2.47	3.02	2.46	2.16	0.58	0.24
	Average	1.85	1.58	2.06	2.23	2.65	2.42	2.13	0.39	0.16
Fall	Surface	1.26	1.72	1.10	1.56	1.63	1.81	1.51	0.28	0.11
	Bottom	1.34	1.35	2.10	1.13	1.97	1.34	1.54	0.40	0.16
	Average	1.30	1.54	1.60	1.35	1.80	1.58	1.53	0.18	0.07

	Analyte	**Phaeophytin a (µg/L)**								
	Station	**DD-HAB 9-STN1**	**DL0-01-5**	**DL0-01-1**	**DL0-01-4**	**DL0-01-2**	**DL0-01-7**	**Average**	**Standard Deviation**	**Standard Error**
Sample Collection Date	Winter	30-Apr-16	26-Apr-16	26-Apr-16	26-Apr-16	26-Apr-16	30-Apr-16	-	-	-
	Summer	24-Jul-16	26-Jul-16	24-Jul-16	25-Jul-16	24-Jul-16	25-Jul-16	-	-	-
	Fall	21-Aug-16	21-Aug-16	21-Aug-16	22-Aug-16	22-Aug-16	22-Aug-16	-	-	-
Winter	Surface	0.43	0.58	0.72	0.37	0.44	0.65	0.53	0.14	0.06
	Bottom	0.57	0.39	0.48	0.38	0.56	0.64	0.50	0.10	0.04
	Average	0.50	0.49	0.60	0.38	0.50	0.65	0.52	0.09	0.04
Summer	Surface	0.59	0.77	0.65	1.09	0.61	1.01	0.79	0.21	0.09
	Bottom	0.57	1.02	0.67	0.94	0.67	0.92	0.80	0.18	0.08
	Average	0.58	0.90	0.66	1.02	0.64	0.97	0.79	0.19	0.08
Fall	Surface	0.52	0.54	0.65	0.52	0.52	0.49	0.54	0.06	0.02
	Bottom	0.52	1.06	0.88	0.49	0.84	0.48	0.71	0.25	0.10
	Average	0.52	0.80	0.77	0.51	0.68	0.49	0.63	0.14	0.06

Table E.9: Statistical comparisons of chlorophyll a concentrations among years of mine construction (2014) and operation (2015, 2016) at mine-exposed Sheardown Lake NW for the Mary River Project CREMP.

Season	Overall 3-group Comparison			Summary		Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test[b]	Year	Mean Concentration (mg/L)	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Winter	YES	0.01755	β	2014	2.55	2014	2015	YES	0.0982	Tukey's (β)
				2015	1.10	2014	2016	YES	0.0158	
				2016	0.87	2015	2016	NO	0.6123	
Summer	YES	0.04169	β	2014	2.43	2014	2015	YES	0.0449	Tukey's (β)
				2015	1.51	2014	2016	NO	0.8630	
				2016	2.13	2015	2016	NO	0.1163	
Fall	YES	0.00554	β	2014	0.80	2014	2015	YES	0.0100	Tukey's (β)
				2015	1.61	2014	2016	YES	0.0132	
				2016	1.53	2015	2016	NO	0.9889	
Annual	NO	0.88904	β	2014	1.93	2014	2015	NO	0.9694	Tamhane's (β)
				2015	1.41	2014	2016	NO	0.9834	
				2016	1.51	2015	2016	NO	0.9997	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Kruskal-Wallis H-test (multiple group comparison) or Mann-Whitney U-test (pair-wise comparison), as appropriate.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table E.10: Phytoplankton monitoring data (i.e., chlorophyll a and phaeophytin a concentrations) collected at Sheardown Lake Southeast (DLO-02), Mary River Project CREMP, 2016.

	Analyte	Chlorophyll a (µg/L)								Phaeophytin a (µg/L)							
	Station	DL0-02-06	DL0-02-07	DL0-02-4	DL0-02-8	DL0-02-03	Average	Standard Deviation	Standard Error	DL0-02-06	DL0-02-07	DL0-02-4	DL0-02-8	DL0-02-03	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	30-Apr-16	29-Apr-16	29-Apr-16	29-Apr-16	29-Apr-16	-	-	-	30-Apr-16	29-Apr-16	29-Apr-16	29-Apr-16	29-Apr-16	-	-	-
	Summer	26-Jul-16	26-Jul-16	26-Jul-16	26-Jul-16	26-Jul-16	-	-	-	26-Jul-16	26-Jul-16	26-Jul-16	26-Jul-16	26-Jul-16	-	-	-
	Fall	21-Aug-16	21-Aug-16	21-Aug-16	21-Aug-16	21-Aug-16	-	-	-	21-Aug-16	21-Aug-16	21-Aug-16	21-Aug-16	21-Aug-16	-	-	-
Winter	Surface	1.67	3.13	-	2.39	2.43	2.41	0.60	0.30	0.60	1.11	0.50	0.76	0.67	0.73	0.23	0.10
	Bottom	1.05	2.67	1.35	1.91	1.08	1.61	0.68	0.31	0.64	0.87	-	0.72	0.55	0.70	0.14	0.07
	Average	1.36	2.90	1.35	2.15	1.76	1.90	0.65	0.29	0.62	0.99	0.50	0.74	0.61	0.69	0.19	0.08
Summer	Surface	1.27	1.27	1.17	1.79	1.49	1.40	0.25	0.11	0.77	0.63	0.91	0.84	0.85	0.80	0.11	0.05
	Bottom	1.30	1.93	1.40	1.61	1.86	1.62	0.28	0.12	0.77	0.73	0.78	0.70	0.89	0.77	0.07	0.03
	Average	1.29	1.60	1.29	1.70	1.68	1.51	0.21	0.09	0.77	0.68	0.85	0.77	0.87	0.79	0.07	0.03
Fall	Surface	3.19	4.37	2.01	4.10	4.18	3.57	0.98	0.44	0.84	1.24	0.89	0.98	0.70	0.93	0.20	0.09
	Bottom	1.89	3.58	2.12	2.29	0.96	2.17	0.94	0.42	0.83	0.90	0.74	0.96	0.82	0.85	0.08	0.04
	Average	2.54	3.98	2.07	3.20	2.57	2.87	0.74	0.33	0.84	1.07	0.82	0.97	0.76	0.89	0.13	0.06

Table E.11: Statistical comparisons of chlorophyll a concentrations among years of mine construction (2014) and operation (2015, 2016) at mine-exposed Sheardown Lake SE for the Mary River Project CREMP.

Season	Overall 3-group Comparison			Summary		Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test[b]	Year	Mean Concentration (mg/L)	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Winter	NO	0.11765	β	2014	2.67	2014	2015	NO	0.1040	Tukey's (β)
				2015	1.58	2014	2016	NO	0.3642	
				2016	1.90	2015	2016	NO	0.6942	
Summer	YES	0.00000	α	2014	0.20	2014	2015	YES	0.0001	Tamhane's (α)
				2015	0.91	2014	2016	YES	0.0004	
				2016	1.51	2015	2016	YES	0.0056	
Fall	YES	0.03835	α	2014	1.54	2014	2015	NO	0.8717	Tamhane's (α)
				2015	0.99	2014	2016	NO	0.3911	
				2016	2.87	2015	2016	YES	0.0130	
Annual	YES	0.00666	ε	2014	1.47	2014	2015	NO	0.6827	ε
				2015	1.16	2014	2016	NO	0.1261	
				2016	2.09	2015	2016	YES	0.0000	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Kruskal-Wallis H-test (multiple group comparison) or Mann-Whitney U-test (pair-wise comparison), as appropriate; ε - transformed data non-normal, Kruskal-Wallis H-test (multiple group comparisons) or Mann-Whitney U-test (pair-wise comparisons) conducted, as appropriate.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table E.12: Phytoplankton monitoring data (i.e., chlorophyll a and phaeophytin a concentrations) collected at the Mary River, Mary River Project CREMP, 2016.

	Station	Upstream Reference			Upstream Mine-Exposed							Downstream Mine-Exposed		
		G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-20	E0-21	C0-10	C0-05	C0-01
Sample Collection Date	Spring	26-Jun-16	26-Jun-16	26-Jun-16	25-Jun-16	26-Jun-16	26-Jun-16	26-Jun-16	26-Jun-16	25-Jun-16	25-Jun-16	25-Jun-16	25-Jun-16	25-Jun-16
	Summer	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16	18-Jul-16
	Fall	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16	19-Aug-16
Chlorophyll a (µg/L)	Spring	0.35	0.26	0.23	0.23	0.20	0.16	0.19	0.21	0.19	0.19	0.19	0.32	0.33
	Summer	0.29	0.24	0.22	0.22	0.22	0.68	0.28	0.26	0.28	0.26	0.27	0.26	0.23
	Fall	0.59	0.29	0.23	0.23	0.23	0.64	0.28	0.18	0.20	0.19	0.18	0.25	0.21
	Average	0.41	0.26	0.23	0.23	0.22	0.49	0.25	0.22	0.22	0.21	0.21	0.28	0.26
	Standard Deviation	0.16	0.03	0.01	0.01	0.02	0.29	0.05	0.04	0.05	0.04	0.05	0.04	0.06
	Standard Error	0.09	0.01	0.00	0.00	0.009	0.17	0.03	0.02	0.03	0.02	0.03	0.02	0.04
Phaeophytin a (µg/L)	Spring	0.39	0.35	0.31	0.30	0.29	0.27	0.27	0.30	0.28	0.28	0.27	0.30	0.29
	Summer	0.44	0.42	0.40	0.39	0.39	0.37	0.37	0.41	0.49	0.41	0.40	0.43	0.36
	Fall	0.46	0.40	0.33	0.39	0.44	0.36	0.36	0.34	0.36	0.38	0.35	0.38	0.29
	Average	0.43	0.39	0.35	0.36	0.37	0.33	0.33	0.35	0.38	0.36	0.34	0.37	0.31
	Standard Deviation	0.04	0.04	0.05	0.05	0.08	0.06	0.06	0.06	0.11	0.07	0.07	0.07	0.04
	Standard Error	0.02	0.02	0.03	0.03	0.04	0.03	0.03	0.032	0.06	0.04	0.04	0.04	0.02

Table E.13: Statistical comparisons of annual average chlorophyll a concentrations among Mary River phytoplankton monitoring stations, 2016.

Overall 10-group Comparison			Pair-wise, post-hoc comparisons[a]				
Significant Difference Among Years?	p-value	Statistical Test[b]	(I) Area	(J) Area	Significant Difference Between 2 Years?	p-value	Statistical Test
NO	0.36058	β	GO-09 Ref	GO-03	NO	0.8716	Tukey's (β)
				GO-01	NO	0.7130	
				EO-10	NO	0.9910	
				EO-03	NO	0.6740	
				EO-20	NO	0.7761	
				EO-21	NO	0.6108	
				CO-10	NO	0.5881	
				CO-05	NO	1.0000	
				CO-01	NO	0.9973	
			GO-03	GO-01	NO	1.0000	
				EO-10	NO	1.0000	
				EO-03	NO	1.0000	
				EO-20	NO	1.0000	
				EO-21	NO	1.0000	
				CO-10	NO	1.0000	
				CO-05	NO	0.9864	
				CO-01	NO	0.9999	
			GO-01	EO-10	NO	0.9993	
				EO-03	NO	1.0000	
				EO-20	NO	1.0000	
				EO-21	NO	1.0000	
				CO-10	NO	1.0000	
				CO-05	NO	0.9470	
				CO-01	NO	0.9977	
			EO-10	EO-03	NO	0.9988	
				EO-20	NO	0.9998	
				EO-21	NO	0.9974	
				CO-10	NO	0.9966	
				CO-05	NO	0.9998	
				CO-01	NO	1.0000	
			EO-03	EO-20	NO	1.0000	
				EO-21	NO	1.0000	
				CO-10	NO	1.0000	
				CO-05	NO	0.9335	
				CO-01	NO	0.9963	
			EO-20	EO-21	NO	1.0000	
				CO-10	NO	1.0000	
				CO-05	NO	0.9656	
				CO-01	NO	0.9991	
			EO-21	CO-10	NO	1.0000	
				CO-05	NO	0.9079	
				CO-01	NO	0.9928	
			CO-10	CO-05	NO	0.8975	
				CO-01	NO	0.9911	
			CO-05	CO-01	NO	1.0000	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Kruskal-Wallis H-test (multiple group comparison) or Mann-Whitney U-test (pair-wise comparison), as appropriate; ε - transformed data non-normal, Kruskal-Wallis H-test (multiple group comparisons) or Mann-Whitney U-test (pair-wise comparisons) conducted, as appropriate.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table E.14: Phytoplankton monitoring data (i.e., chlorophyll a and phaeophytin a concentrations) collected at Mary Lake (north and south basins; BLO), Mary River Project CREMP, 2016.

	Analyte	Chlorophyll a (µg/L)												
	Station	Mary Lake North			Mary Lake South							Average	Standard Deviation	Standard Error
		BL0-01A	BL0-01	BL0-01B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06			
Sample Collection Date	Winter	25-Apr-16	1-May-16	25-Apr-16	1-May-16	1-May-16	1-May-16	6-May-16	6-May-16	6-May-16	6-May-16	-	-	-
	Summer	26-Jul-16	26-Jul-16	26-Jul-16	30-Jul-16	30-Jul-16	30-Jul-16	30-Jul-16	30-Jul-16	30-Jul-16	29-Jul-16	-	-	-
	Fall	21-Aug-16	21-Aug-16	21-Aug-16	23-Aug-16	23-Aug-16	23-Aug-16	24-Aug-16	23-Aug-16	23-Aug-16	23-Aug-16	-	-	-
Winter	Surface	0.23	0.30	0.27	0.30	0.31	0.87	0.15	0.48	0.27	0.59	0.38	0.21	0.07
	Bottom	<0.10	<0.10	-	<0.10	<0.10	0.55	<0.10	<0.10	0.17	0.19	0.17	0.15	0.05
	Average	0.17	0.20	-	0.20	0.21	0.71	0.13	0.29	0.22	0.39	0.28	0.18	0.06
Summer	Surface	1.35	1.43	1.08	1.31	1.56	1.09	1.84	1.50	1.61	0.77	1.35	0.31	0.10
	Bottom	0.92	1.10	1.08	0.86	0.45	1.21	0.80	0.50	0.77	0.79	0.85	0.25	0.08
	Average	1.14	1.27	1.08	1.09	1.01	1.15	1.32	1.00	1.19	0.78	1.10	0.15	0.05
Fall	Surface	1.20	1.03	1.03	0.70	0.87	0.71	1.28	0.87	0.81	1.46	1.00	0.25	0.08
	Bottom	0.85	0.76	1.11	<0.10	0.78	0.84	0.70	0.31	0.45	0.65	0.66	0.29	0.09
	Average	1.03	0.90	1.07	0.40	0.83	0.78	0.99	0.59	0.63	1.06	0.83	0.23	0.07

	Analyte	Phaeophytin a (µg/L)												
	Station	Mary Lake North			Mary Lake South							Average	Standard Deviation	Standard Error
		BL0-01A	BL0-01	BL0-01B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06			
Sample Collection Date	Winter	25-Apr-16	1-May-16	25-Apr-16	1-May-16	1-May-16	1-May-16	6-May-16	6-May-16	6-May-16	6-May-16			
	Summer	26-Jul-16	26-Jul-16	26-Jul-16	30-Jul-16	30-Jul-16	30-Jul-16	30-Jul-16	30-Jul-16	30-Jul-16	29-Jul-16			
	Fall	21-Aug-16	21-Aug-16	21-Aug-16	23-Aug-16	23-Aug-16	23-Aug-16	24-Aug-16	23-Aug-16	23-Aug-16	23-Aug-16			
Winter	Surface	<0.39	0.35	<0.39	0.36	0.34	0.57	0.28	0.44	0.32	0.59	0.40	0.10	0.03
	Bottom	<0.39	0.24	-	0.26	0.25	0.47	0.24	0.23	0.21	0.28	0.29	0.09	0.03
	Average	0.39	0.30	-	0.31	0.30	0.52	0.26	0.34	0.27	0.44	0.35	0.09	0.03
Summer	Surface	0.60	0.72	0.67	0.77	0.96	0.71	0.98	0.79	0.91	0.64	0.78	0.13	0.04
	Bottom	0.58	0.71	0.72	0.74	0.42	0.77	0.70	0.51	0.72	0.65	0.65	0.11	0.04
	Average	0.59	0.72	0.70	0.76	0.69	0.74	0.84	0.65	0.82	0.65	0.71	0.08	0.02
Fall	Surface	0.56	0.61	0.47	0.50	0.54	0.52	0.54	0.50	0.54	0.74	0.55	0.08	0.02
	Bottom	0.50	0.52	0.52	0.19	0.67	0.50	0.53	0.40	0.56	0.49	0.49	0.12	0.04
	Average	0.53	0.57	0.50	0.35	0.61	0.51	0.54	0.45	0.55	0.62	0.52	0.08	0.02

Table E.15: Statistical comparisons of chlorophyll a concentrations among years of mine construction (2014) and operation (2015, 2016) at the Mary Lake north basin, Mary River Project CREMP.

Season	Overall 3-group Comparison			Summary		Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test[b]	Year	Mean Concentration (mg/L)	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Winter	NO	0.57698	β , γ	2014	0.59	2014	2015	NO	0.9700	Tukey's (β , γ)
				2015	0.65	2014	2016	NO	0.6836	
				2016	0.18	2015	2016	NO	0.5678	
Summer	NO	0.65930	α	2014	0.92	2014	2015	NO	0.9670	Tukey's (α)
				2015	0.83	2014	2016	NO	0.7904	
				2016	1.16	2015	2016	NO	0.6521	
Fall	YES	0.02366	α	2014	0.52	2014	2015	NO	0.7072	Tukey's (α)
				2015	0.62	2014	2016	YES	0.0242	
				2016	1.00	2015	2016	NO	0.0649	
Annual	NO	0.65816	β , γ	2014	0.67	2014	2015	NO	0.8207	Tukey's (β , γ)
				2015	0.70	2014	2016	NO	0.6433	
				2016	0.85	2015	2016	NO	0.9451	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Kruskal-Wallis H-test (multiple group comparison) or Mann-Whitney U-test (pair-wise comparison), as appropriate.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.05.

Table E.16: Statistical comparisons of chlorophyll a concentrations among years of mine construction (2014) and operation (2015, 2016) at the Mary Lake south basin, Mary River Project CREMP.

Season	Overall 3-group Comparison			Summary		Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test[b]	Year	Mean Concentration (mg/L)	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Winter	NO	0.26761	β , γ	2014	0.88	2014	2015	NO	0.6987	Tukey's (β , γ)
				2015	0.65	2014	2016	NO	0.6657	
				2016	0.31	2015	2016	NO	0.2380	
Summer	NO	0.33073	α	2014	0.86	2014	2015	NO	0.9845	Tamhane's (α)
				2015	0.79	2014	2016	NO	0.7789	
				2016	1.08	2015	2016	NO	0.0118	
Fall	NO	0.40871	α	2014	0.75	2014	2015	NO	0.4710	Tukey's (α)
				2015	0.90	2014	2016	NO	0.9999	
				2016	0.75	2015	2016	NO	0.4794	
Annual	NO	0.41963	β , γ	2014	0.83	2014	2015	NO	0.5285	Tamhane's (β , γ)
				2015	0.78	2014	2016	NO	0.9961	
				2016	0.71	2015	2016	NO	0.5288	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Kruskal-Wallis H-test (multiple group comparison) or Mann-Whitney U-test (pair-wise comparison), as appropriate.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

APPENDIX F

BENTHIC INVERTEBRATE COMMUNITY DATA

Table F.1: Summary of habitat features at lotic environments evaluated as part of the 2016 Mary River Project CREMP benthic invertebrate community assessment.

Habitat Characteristic		Reference Creek	Camp Lake Tributary 1			Camp Lake Tributary 2		Sheardown Tributaries			Mary River Upstream		Mary River Downstream		
		REF-CRK	CLT-1 US	CLT-1-L2	CLT-1 DS	CLT-2 US	CLT-2 DS	SDLT-1 Reach 1	SDLT-12 DS	SDLT-9 DS	GO-09	GO-03	EO-01	EO-20	CO-05
Mean Width (m)	Wetted	9	4.7	1.9	5.7	4.3	4.8	4.2	0.5	0.9	33.0	20.0	20.0	12.5	90
	Bankfull	36	30.0	3.3	5.7	9.0	4.8	8.0	35.5	10.0	90.0	120.0	170.0	59.5	110
Mean Depth (m)	Average	0.13	0.12	0.19	0.29	0.15	0.97	0.09	0.06	0.06	0.36	0.28	-	0.34	-
Mean Velocity (m/s)	Average	0.26	0.30	0.24	0.12	0.36	0.27	0.33	0.16	0.21	0.20	0.61	-	0.52	-
Stream Morphology	% Pool	5	15	5	0	20	0	0	30	15	20	0	5	10	20
	% Rapid	15	10	0	10	30	30	40	60	5	30	70	40	40	20
	% Riffle	50	50	50	80	30	60	60	10	75	20	10	15	20	20
	% Run	30	25	45	10	20	10	0	0	10	30	20	40	30	40
Substrate (% areal coverage)		40% cobble 30% pebble 15% gravel 10% sand 5% boulder	40% cobble 30% boulder 20% pebble 5% gravel 5% sand	30% cobble 30% pebble 30% gravel 10% sand	60% cobble 20% pebble 10% gravel 5% boulder 5% sand	60% boulder 30% cobble 10% pebble	60% cobble 30% pebble 10% gravel	40% cobble 30% boulder 20% pebble 10% gravel	80% boulder 15% cobble 5% pebble	20% cobble 15% boulder 10% pebble 10% gravel 5% sand	70% boulder 20% cobble 10% pebble	60% boulder 30% cobble 10% pebble	60% boulder 25% cobble 10% pebble 5% gravel	40% boulder 30% cobble 20% pebble 10% gravel	30% cobble 20% pebble 20% gravel 20% sand 10% boulder
Aquatic Vegetation (% areal coverage)	Periphyton Coverage	25%	50%	50%	50%	25%	25%	50%	25%	50%	25%	25%	25%	25%	25%
	Periphyton Description	0.5 to 1 mm thick of attached algae/periphyton on rocks	1 to 5 mm thick of attached algae/periphyton on rocks	1 to 5 mm thick of attached algae/periphyton on rocks	1 to 5 mm thick of attached algae/periphyton on rocks	0.5 to 1 mm thick of attached algae/periphyton on rocks	0.5 to 1 mm thick of attached algae/periphyton on rocks	1 to 5 mm thick of attached algae/periphyton on rocks	0.5 to 1 mm thick of attached algae/periphyton on rocks	1 to 5 mm thick of attached algae/periphyton on rocks	0.5 to 1 mm thick of attached algae/periphyton on rocks	0.5 to 1 mm thick of attached algae/periphyton on rocks	0.5 to 1 mm thick of attached algae/periphyton on rocks	0.5 to 1 mm thick of attached algae/periphyton on rocks	0.5 to 1 mm thick of attached algae/periphyton on rocks
Functional Instream Cover (% areal coverage)		5% undercut banks 2% boulder 2% deep pool	30% boulder 10% undercut banks 5% deep pool	5% undercut banks	none	60% boulder 10% deep pool	none	30% boulder	10% boulder	5% undercut banks 5% boulder	50% boulder	30% boulder	30% boulder	30% boulder	5% boulder 5% deep pool

Table F.2: Replicate grab data for benthic invertebrate community samples collected at the Camp Lake Tributaries, Mary River Project CREMP, August 2016.

Study Area	Station	Water Depth (cm)			Water Velocity (m/s)			Substrate Size[a] (cm)			Embeddedness		
		Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3
Camp Lake Tributary 1 Upstream	CLT-1 US B1	12	12	14	0.38	0.34	0.32	6.4	6.1	6.8	50%	25%	25%
	CLT-1 US B2	12	12	14	0.36	0.45	0.37	7.4	7.6	6.1	50%	50%	50%
	CLT-1 US B3	10	10	14	0.37	0.44	0.40	6.5	5.5	8.6	50%	25%	50%
	CLT-1 US B4	12	14	12	0.33	0.30	0.46	8.7	6.4	7.4	25%	25%	-
	CLT-1 US B5	8	8	10	0.28	0.39	0.26	7.1	6.3	6.8	25%	25%	25%
Camp Lake Tributary 1 Downstream	CLT-1 DS B1	12	12	14	0.38	0.51	0.48	4.7	6.0	5.3	-	25%	25%
	CLT-1 DS B2	14	14	14	0.41	0.46	0.39	6.5	5.4	7.1	25%	25%	25%
	CLT-1 DS B3	14	12	12	0.28	0.40	0.44	5.3	6.8	4.8	25%	25%	50%
	CLT-1 DS B4	12	14	14	0.41	0.36	0.31	5.2	3.8	6.5	25%	25%	25%
	CLT-1 DS B5	12	10	12	0.31	0.34	0.48	5.0	6.0	5.8	25%	25%	25%
Camp Lake Tributary 1 L2 Mine Exposed	CLT-1 L2 B1	8	8	8	0.35	0.38	0.38	6.2	6.6	5.6	25%	25%	25%
	CLT-1 L2 B2	6	8	8	0.26	0.28	0.33	5.0	6.7	5.3	25%	25%	25%
	CLT-1 L2 B3	6	6	8	0.38	0.27	0.26	4.6	4.7	6.5	25%	25%	25%
	CLT-1 L2 B4	6	14	10	0.33	0.37	0.41	6.6	4.4	4.9	25%	25%	25%
	CLT-1 L2 B5	10	12	12	0.28	0.22	0.23	5.4	8.0	8.2	25%	25%	25%
Camp Lake Tributary 2 Upstream	CLT-2 US B1	14	14	10	0.51	0.30	0.44	5.4	7.3	4.5	25%	50%	25%
	CLT-2 US B2	12	12	10	0.43	0.38	0.33	7.7	5.9	6.1	25%	25%	25%
	CLT-2 US B3	16	18	12	0.41	0.39	0.33	4.0	8.1	9.7	25%	25%	25%
	CLT-2 US B4	14	14	14	0.44	0.22	0.41	9.3	6.4	7.5	50%	50%	50%
	CLT-2 US B5	12	14	8	0.28	0.47	0.32	7.4	7.1	10.5	50%	75%	50%
Camp Lake Tributary 2 Downstream	CLT-2 DS B1	10	10	12	0.43	0.51	0.36	5.2	4.8	6.9	50%	50%	50%
	CLT-2 DS B2	12	14	12	0.51	0.43	0.46	5.1	7.0	5.2	25%	50%	25%
	CLT-2 DS B3	10	12	10	0.43	0.31	0.31	5.5	4.6	7.6	25%	25%	25%
	CLT-2 DS B4	16	12	10	0.38	0..51	0.28	3.7	6.5	4.8	25%	25%	25%
	CLT-2 DS B5	12	12	10	0.55	0.48	0.53	5.1	4.9	5.5	25%	25%	25%

[a] Substrate measurements taken on the intermediate axis of each individual particle observed within the Surber sampler area as viewed from the surface prior to sampling. Sample size ranged from 5 - 14 measurements per replicate grab, with a mean of 9 for the Camp Lake tributaries as part of the 2016 stream sampling program.

Table F.3: Replicate station habitat feature summary statistics for the Camp Lake Tributary benthic stations, Mary River Project CREMP, August 2016. Five stations were sampled at each study area.

Metric	Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Water Depth (cm)	Unnamed Reference Creek	12.5	2.3	1.0	9.7	15.4	10.7	15.3
	CLT1-US North Branch	11.6	1.7	0.8	9.4	13.8	8.7	12.7
	CLT1-L2 Upper Main Stem	8.7	1.9	0.9	6.3	11.1	6.7	11.3
	CLT1-DS Lower Main Stem	12.8	1.0	0.4	11.6	14.0	11.3	14.0
	CLT2-US Upstream	12.9	1.7	0.8	10.8	15.1	11.3	15.3
	CLT2-DS Downstream	11.6	1.0	0.5	10.3	12.9	10.7	12.7
Water Velocity (cm/s)	Unnamed Reference Creek	29.8	3.6	1.6	25.4	34.2	24.0	33.3
	CLT1-US North Branch	36.3	3.7	1.7	31.7	41.0	31.0	40.3
	CLT1-L2 Upper Main Stem	31.5	5.5	2.4	24.7	38.3	24.3	37.0
	CLT1-DS Lower Main Stem	39.7	4.0	1.8	34.8	44.7	36.0	45.7
	CLT2-US Upstream	37.7	2.5	1.1	34.7	40.8	35.7	41.7
	CLT2-DS Downstream	42.0	8.0	3.6	32.1	51.9	33.0	52.0
Substrate Size (cm diameter)	Unnamed Reference Creek	7.0	0.7	0.3	6.1	7.8	5.9	7.5
	CLT1-US North Branch	6.9	0.4	0.2	6.4	7.4	6.4	7.5
	CLT1-L2 Upper Main Stem	5.9	0.8	0.4	4.9	6.9	5.3	7.2
	CLT1-DS Lower Main Stem	5.6	0.4	0.2	5.1	6.2	5.2	6.3
	CLT2-US Upstream	7.1	1.0	0.5	5.9	8.4	5.7	8.3
	CLT2-DS Downstream	5.5	0.4	0.2	5.0	6.0	5.0	5.9
Substrate Embeddedness (%)	Unnamed Reference Creek	25	0	0	25	25	25	25
	CLT1-US North Branch	35	11	5	22	48	25	50
	CLT1-L2 Upper Main Stem	25	0	0	25	25	25	25
	CLT1-DS Lower Main Stem	27	4	2	22	31	25	33
	CLT2-US Upstream	38	15	7	20	57	25	58
	CLT2-DS Downstream	32	11	5	18	45	25	50

Table F.4: Benthic station habitat feature statistical comparisons among Camp Lake Tributary 1 and Unnamed Reference Creek study areas, Mary River Project CREMP, August 2016. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Areas?	p-value	Statistical Test [b]	(I) Area	(J) Area	Significant Difference Between 2 Areas?	p-value	Statistical Test
Water Depth (cm)	YES	0.0083	α , ζ	Unnamed Reference Creek	CLT1 North Branch	NO	0.8410	Tukey's HSD
				Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.0171	
				Unnamed Reference Creek	CLT1 Lower Main Stem	NO	0.9956	
				CLT1 North Branch	CLT1 Upper Main Stem	YES	0.0847	
				CLT1 North Branch	CLT1 Lower Main Stem	NO	0.7203	
				CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	0.0108	
Water Velocity (cm/s)	YES	0.0078	α	Unnamed Reference Creek	CLT1 North Branch	NO	0.1125	Tukey's HSD
				Unnamed Reference Creek	CLT1 Upper Main Stem	NO	0.9165	
				Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.0097	
				CLT1 North Branch	CLT1 Upper Main Stem	NO	0.3180	
				CLT1 North Branch	CLT1 Lower Main Stem	NO	0.5992	
				CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	0.0353	
Substrate Size (cm diameter)	YES	0.0048	α	Unnamed Reference Creek	CLT1 North Branch	NO	0.9995	Tukey's HSD
				Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.0669	
				Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.0145	
				CLT1 North Branch	CLT1 Upper Main Stem	YES	0.0819	
				CLT1 North Branch	CLT1 Lower Main Stem	YES	0.0181	
				CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.8631	
Substrate Embeddedness (%)	YES	0.0409	α , ζ	Unnamed Reference Creek	CLT1 North Branch	NO	0.4987	Tamhane's
				Unnamed Reference Creek	CLT1 Upper Main Stem	NO	1.0000	
				Unnamed Reference Creek	CLT1 Lower Main Stem	NO	0.9398	
				CLT1 North Branch	CLT1 Upper Main Stem	NO	0.4987	
				CLT1 North Branch	CLT1 Lower Main Stem	NO	0.6648	
				CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.9398	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data logit transformed, single factor ANOVA test conducted;

Table F.5: Benthic invertebrate community data for Camp Lake Tributary 1 study areas, August 2016. Densities expressed in number of organisms per square meter.

Station	Unnamed Reference Creek					Camp Lake Tributary 1 - North Branch (CLT1-US)				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
ROUNDWORMS										
P. Nemata	29	29	29	22	18	7	7	29	32	39
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Enchytraeidae	57	29	50	43	22	0	11	36	36	36
F. Naididae										
S.F. Tubificinae										
immatures with hair chaetae						0	0	0	0	0
F. Lumbriculidae										
Lumbriculus	0	0	0	0	0	7	0	0	0	0
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina	0	0	0	0	0	0	0	0	0	0
F. Hygrobatidae										
Hygrobates	0	0	0	0	0	0	0	0	0	0
F. Lebertiidae										
Lebertia	0	0	0	0	0	0	0	0	0	0
F. Sperchonidae										
Sperchon	258	144	179	187	122	57	104	208	158	237
HARPACTICOIDS										
O. Harpacticoida	0	0	0	0	0	0	0	0	0	0
SEED SHRIMPS										
Cl. Ostracoda	57	29	36	22	29	0	0	0	0	0
SPRINGTAILS										
Cl. Entognatha										
O. Collembola	0	0	0	0	0	0	0	0	0	0
INSECTS										
Cl. Insecta										
MAYFLIES										
O. Ephemeroptera										
F. Baetidae										
Acentrella feropagus	0	7	14	0	0	0	4	0	0	0
STONEFLIES										
O. Plecoptera										
F. Capniidae										
immature	0	0	0	0	0	7	7	0	7	0
TRUE FLIES										
O. Diptera										
BITING-MIDGE										
F. Ceratopogonidae										
Culicoides	0	0	0	0	0	0	0	0	0	0
indeterminate	0	0	0	0	0	0	0	0	0	0
MIDGES										
F. Chironomidae										
chironomid pupae	**201**	**108**	**72**	**129**	**75**	**36**	**18**	**72**	**50**	**36**
S.F. Chironominae										
Cladotanytarsus	0	0	0	0	0	0	0	0	0	0
Micropsectra	0	0	11	14	0	0	4	0	0	0
Paratanytarsus	0	0	0	0	0	0	0	0	0	0
Rheotanytarsus	43	29	0	14	14	0	0	0	0	0
Tanytarsus	0	7	0	29	0	0	4	0	0	0
S.F. Diamesinae										
Diamesa	0	0	0	0	4	0	0	0	0	14
Pseudokiefferiella	57	237	140	61	29	14	83	36	165	624

Table F.5: Benthic invertebrate community data for Camp Lake Tributary 1 study areas, August 2016. Densities expressed in number of organisms per square meter.

Station	Unnamed Reference Creek					Camp Lake Tributary 1 - North Branch (CLT1-US)				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
S.F. Orthocladiinae										
Chaetocladius	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	11	0	0	0	0	0	0	0
Cricotopus	388	258	276	244	83	165	222	215	563	222
Cricotopus/Orthocladius	0	72	115	90	18	43	47	115	388	402
Diplocladius	14	0	0	0	0	0	0	0	0	0
Doncricotopus	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	0	0	14	0	11	0	0	0	0	0
Hydrobaenus	14	0	0	14	0	0	11	14	0	0
Hydrosmittia	29	14	0	0	0	43	47	86	309	233
Krenosmittia	0	0	0	0	4	0	0	7	0	0
Limnophyes	0	29	0	14	4	14	0	22	0	14
Metriocnemus	0	0	0	0	0	0	0	0	0	0
Nanocladius	0	0	0	0	0	0	0	0	0	0
Orthocladius (Euorthocladius)	0	0	0	0	0	72	133	330	176	431
Parakiefferiella	0	7	11	0	0	0	0	0	0	0
Paraphaenocladius	14	0	25	47	4	0	0	0	0	0
Synorthocladius						0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0
Tokunagaia	660	179	581	954	90	43	36	57	57	97
Tvetenia	57	86	115	75	39	0	4	0	0	0
indeterminate	**14**	**14**	0	0	0	0	**18**	0	**29**	0
S.F. Tanypodinae										
Procladius	0	0	0	0	0	0	0	0	0	0
Thienemannimyia complex	0	7	7	14	4	0	0	0	0	0
F. Empididae										
Clinocera	201	93	79	43	39	0	4	36	0	50
pupae	0	0	0	0	0	0	0	0	0	**14**
F. Ephydridae	0	0	0	0	0	0	0	0	0	0
F. Muscidae	4	0	0	0	0	0	0	0	0	0
F. Simuliidae										
Gymnopais	0	0	7	0	4	0	4	0	0	0
Prosimulium	14	14	0	7	0	7	0	7	0	0
pupae	0	0	0	0	0	0	0	0	0	0
F. Tipulidae										
Tipula	68	25	97	65	57	305	161	158	237	219
Number of Organisms (No. organisms per m^2)	2,179	1,417	1,869	2,088	670	820	929	1,428	2,207	2,668
Richness (total number of taxa)[a]	17	19	19	19	19	13	18	15	11	13
Simpson's Evenness (E)	0.853	0.924	0.885	0.764	0.940	0.854	0.903	0.923	0.926	0.932
Bray-Curtis Index	0.207	0.276	0.092	0.173	0.437	0.645	0.537	0.490	0.587	0.602
Percent Composition										
% Nemata	1.3%	2.0%	1.6%	1.1%	2.7%	0.9%	0.8%	2.0%	1.4%	1.5%
% Oligochaeta	2.6%	2.0%	2.7%	2.1%	3.3%	0.9%	1.2%	2.5%	1.6%	1.3%
% Hydracarina	11.8%	10.2%	9.6%	9.0%	18.2%	7.0%	11.2%	14.6%	7.2%	8.9%
% Ostracods	2.6%	2.0%	1.9%	1.1%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%
% Chironomids	68.4%	73.9%	73.7%	81.4%	56.6%	52.4%	67.5%	66.8%	78.7%	77.7%
% Metal Sensitive Chironmids	4.6%	19.3%	8.1%	5.7%	7.0%	1.7%	9.8%	2.5%	7.5%	23.9%
% Tipulidae	3.1%	1.8%	5.2%	3.1%	8.5%	37.2%	17.3%	11.1%	10.7%	8.2%
Functional Feeding Group Composition										
% Shredders	24.0%	28.2%	27.2%	20.4%	27.3%	65.7%	49.0%	36.1%	56.3%	32.0%
% Collector - Gatherers	51.9%	50.7%	57.6%	64.6%	44.6%	26.5%	38.0%	46.4%	36.5%	56.7%
% Filterers	2.9%	3.8%	1.0%	3.3%	3.3%	0.9%	1.4%	0.5%	0.0%	0.0%
Habitat Preference Group Composition										
% Clingers	44.8%	47.0%	36.2%	30.9%	46.1%	35.5%	42.9%	42.6%	52.4%	35.1%
% Sprawlers	48.1%	47.1%	54.4%	62.9%	39.4%	25.6%	37.2%	41.8%	33.8%	53.9%
% Burrowers	7.1%	5.9%	9.4%	6.2%	14.5%	38.9%	19.3%	15.6%	13.8%	11.0%

[a] Bold entries excluded from taxa count

Table F.5: Benthic invertebrate community data for Camp Lake Tributary 1 study areas, August 2016. Densities expressed in number of organisms per square meter.

Station	Camp Lake Tributary 1 - Upper Main Stem (CLT1-L2)					Camp Lake Tributary 1 - Lower Main Stem (CLT1-DS)				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
ROUNDWORMS										
P. Nemata	29	187	86	115	86	14	22	158	100	11
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Enchytraeidae	301	1,005	1,234	2,009	201	72	36	158	172	126
F. Naididae										
S.F. Tubificinae										
immatures with hair chaetae	0	0	0	0	0	0	0	0	0	0
F. Lumbriculidae										
Lumbriculus	14	50	0	0	39	0	0	0	0	0
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina	0	0	0	0	0	0	0	0	0	0
F. Hygrobatidae										
Hygrobates	0	14	0	0	0	0	7	14	14	0
F. Lebertiidae										
Lebertia	0	14	0	29	57	0	0	0	0	0
F. Sperchonidae										
Sperchon	1,651	2,139	2,009	1,808	1,005	43	29	43	86	32
HARPACTICOIDS										
O. Harpacticoida	0	0	0	29	115	0	7	0	0	0
SEED SHRIMPS										
Cl. Ostracoda	14	14	14	0	57	0	0	0	0	0
SPRINGTAILS										
Cl. Entognatha										
O. Collembola	0	0	0	0	0	0	0	0	0	11
INSECTS										
Cl. Insecta										
MAYFLIES										
O. Ephemeroptera										
F. Baetidae										
Acentrella feropagus	0	0	0	0	0	0	0	0	0	0
STONEFLIES										
O. Plecoptera										
F. Capniidae										
immature	0	0	0	0	0	0	0	0	0	0
TRUE FLIES										
O. Diptera										
BITING-MIDGE										
F. Ceratopogonidae										
Culicoides	0	0	0	0	29	0	0	0	14	0
indeterminate	14	0	14	0	0	0	0	0	0	0
MIDGES										
F. Chironomidae										
chironomid pupae	**115**	**86**	**72**	**29**	0	**86**	**43**	**29**	**14**	**36**
S.F. Chironominae										
Cladotanytarsus	0	165	0	230	330	14	0	0	0	0
Micropsectra	0	0	0	0	0	0	7	14	0	0
Paratanytarsus	1668	1554	832	1722	4116	0	0	0	14	0
Rheotanytarsus	0	0	0	0	0	14	0	0	0	0
Tanytarsus	183	136	0	86	111	0	0	0	0	0
S.F. Diamesinae										
Diamesa	0	0	0	0	0	0	0	0	0	4
Pseudokiefferiella	25	380	201	201	0	0	7	14	158	18

Table F.5: Benthic invertebrate community data for Camp Lake Tributary 1 study areas, August 2016. Densities expressed in number of organisms per square meter.

Station	Camp Lake Tributary 1 - Upper Main Stem (CLT1-L2)					Camp Lake Tributary 1 - Lower Main Stem (CLT1-DS)				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
S.F. Orthocladiinae										
Chaetocladius	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0	0	0	0
Cricotopus	965	872	847	1,349	1,098	57	22	57	187	144
Cricotopus/Orthocladius	83	190	43	29	111	57	22	57	57	43
Diplocladius	0	0	0	0	0	0	0	0	0	0
Doncricotopus	287	438	129	144	384	0	0	0	0	0
Eukiefferiella	0	0	0	0	0	29	0	14	0	0
Hydrobaenus	0	0	0	0	0	14	7	57	29	4
Hydrosmittia	108	83	57	230	273	187	431	574	531	190
Krenosmittia	0	0	0	0	0	0	0	14	0	0
Limnophyes	129	273	115	545	165	43	14	72	115	22
Metriocnemus	0	0	0	0	0	29	0	0	0	0
Nanocladius	57	0	0	0	0	0	0	0	0	0
Orthocladius (Euorthocladius)	0	0	0	0	0	0	57	29	129	68
Parakiefferiella	57	136	115	603	603	0	0	14	14	7
Paraphaenocladius	0	0	0	0	0	0	0	0	14	0
Synorthocladius	0	0	14	57	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0
Tokunagaia	57	0	0	0	0	72	43	43	29	25
Tvetenia	57	29	14	0	0	29	14	14	43	11
indeterminate	0	0	0	0	0	0	0	0	0	0
S.F. Tanypodinae										
Procladius	25	0	29	29	0	0	0	0	0	0
Thienemannimyia complex	183	165	129	115	273	0	0	0	0	0
F. Empididae										
Clinocera	0	29	14	0	0	0	0	14	0	18
pupae	0	0	0	0	0	0	0	0	0	0
F. Ephydridae	0	0	0	0	0	0	0	0	0	0
F. Muscidae	4	0	29	0	0	0	0	0	0	0
F. Simuliidae										
Gymnopais	0	0	0	0	0	0	0	0	0	0
Prosimulium	0	0	0	0	0	0	0	0	0	0
pupae	0	0	0	0	0	0	0	0	0	0
F. Tipulidae										
Tipula	61	29	50	0	11	54	54	32	72	97
Number of Organisms (No. organisms per m^2	6,087	7,988	6,047	9,359	9,064	814	822	1,421	1,792	867
Richness (total number of taxa)[a]	22	21	20	18	19	15	16	19	18	17
Simpson's Evenness (E)	0.851	0.894	0.846	0.901	0.798	0.943	0.710	0.835	0.914	0.920
Bray-Curtis Index	0.780	0.834	0.804	0.883	0.875	0.656	0.784	0.768	0.634	0.656
Percent Composition										
% Nemata	0.5%	2.3%	1.4%	1.2%	0.9%	1.7%	2.7%	11.1%	5.6%	1.3%
% Oligochaeta	5.2%	13.2%	20.4%	21.5%	2.6%	8.8%	4.4%	11.1%	9.6%	14.5%
% Hydracarina	27.1%	27.1%	33.2%	19.6%	11.7%	5.3%	4.4%	4.0%	5.6%	3.7%
% Ostracods	0.2%	0.2%	0.2%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%
% Chironomids	65.7%	56.4%	42.9%	57.4%	82.3%	77.5%	81.1%	70.5%	74.4%	66.0%
% Metal Sensitive Chironmids	30.8%	28.0%	17.1%	23.9%	50.3%	3.4%	1.7%	2.0%	9.6%	2.5%
% Tipulidae	1.0%	0.4%	0.8%	0.0%	0.1%	6.6%	6.6%	2.3%	4.0%	11.2%
Functional Feeding Group Composition										
% Shredders	18.7%	13.9%	16.0%	14.8%	13.5%	22.7%	12.4%	10.6%	17.8%	34.3%
% Collector - Gatherers	19.0%	32.8%	33.0%	42.1%	21.2%	68.1%	82.4%	83.4%	75.1%	60.0%
% Filterers	31.3%	23.7%	14.2%	21.9%	50.3%	3.9%	0.9%	1.0%	0.8%	0.0%
Habitat Preference Group Composition										
% Clingers	44.8%	41.0%	48.6%	34.4%	25.1%	21.4%	10.2%	13.4%	19.4%	28.8%
% Sprawlers	45.2%	39.2%	28.5%	39.5%	66.0%	53.3%	76.2%	62.1%	60.7%	42.9%
% Burrowers	6.9%	15.9%	22.9%	22.7%	4.0%	21.4%	13.6%	24.5%	20.0%	27.0%

[a] Bold entries excluded from taxa count

Table F.6: Benthic invertebrate community summary statistics for Camp Lake Tributary 1 study areas, Mary River Project CREMP, August 2016. Sample size equals five for all study areas.

Metric	Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Density (no. organisms / m^2)	Unnamed Reference Creek	1,645	619	277	876	2,414	670	2,179
	CLT1 North Branch	1,610	806	360	610	2,611	820	2,668
	CLT1 Upper Main Stem	7,709	1,583	708	5,743	9,675	6,047	9,359
	CLT1 Lower Main Stem	1,143	443	198	593	1,694	814	1,792
Richness (Number of Taxa)	Unnamed Reference Creek	18.6	0.9	0.4	17.5	19.7	17.0	19.0
	CLT1 North Branch	14.0	2.6	1.2	10.7	17.3	11.0	18.0
	CLT1 Upper Main Stem	20.0	1.6	0.7	18.0	22.0	18.0	22.0
	CLT1 Lower Main Stem	17.0	1.6	0.7	15.0	19.0	15.0	19.0
Simpson's Evenness	Unnamed Reference Creek	0.873	0.070	0.031	0.786	0.960	0.764	0.940
	CLT1 North Branch	0.908	0.032	0.014	0.868	0.947	0.854	0.932
	CLT1 Upper Main Stem	0.858	0.042	0.019	0.806	0.910	0.798	0.901
	CLT1 Lower Main Stem	0.864	0.095	0.043	0.746	0.982	0.710	0.943
Bray-Curtis Index	Unnamed Reference Creek	0.237	0.130	0.058	0.076	0.398	0.092	0.437
	CLT1 North Branch	0.572	0.060	0.027	0.498	0.647	0.490	0.645
	CLT1 Upper Main Stem	0.835	0.044	0.020	0.780	0.890	0.780	0.883
	CLT1 Lower Main Stem	0.700	0.071	0.032	0.612	0.787	0.634	0.784
Oligochaeta (% of community)	Unnamed Reference Creek	2.5%	0.5%	0.2%	1.9%	3.2%	2.0%	3.3%
	CLT1 North Branch	1.5%	0.6%	0.3%	0.7%	2.3%	0.9%	2.5%
	CLT1 Upper Main Stem	12.6%	8.6%	3.8%	1.9%	23.2%	2.6%	21.5%
	CLT1 Lower Main Stem	9.7%	3.7%	1.6%	5.1%	14.3%	4.4%	14.5%
Hydracarina (% of community)	Unnamed Reference Creek	11.7%	3.8%	1.7%	7.1%	16.4%	9.0%	18.2%
	CLT1 North Branch	9.8%	3.2%	1.4%	5.8%	13.7%	7.0%	14.6%
	CLT1 Upper Main Stem	23.8%	8.3%	3.7%	13.5%	34.0%	11.7%	33.2%
	CLT1 Lower Main Stem	4.6%	0.8%	0.4%	3.6%	5.6%	3.7%	5.6%
Chironomidae (% of community)	Unnamed Reference Creek	70.8%	9.2%	4.1%	59.4%	82.2%	56.6%	81.4%
	CLT1 North Branch	68.6%	10.6%	4.7%	55.5%	81.8%	52.4%	78.7%
	CLT1 Upper Main Stem	61.0%	14.5%	6.5%	43.0%	78.9%	42.9%	82.3%
	CLT1 Lower Main Stem	73.9%	5.9%	2.6%	66.6%	81.3%	66.0%	81.1%
Metal-Sensitive Chironomidae (% of community)	Unnamed Reference Creek	8.9%	5.9%	2.7%	1.6%	16.3%	4.6%	19.3%
	CLT1 North Branch	9.1%	9.0%	4.0%	-2.0%	20.2%	1.7%	23.9%
	CLT1 Upper Main Stem	30.0%	12.4%	5.6%	14.6%	45.5%	17.1%	50.3%
	CLT1 Lower Main Stem	3.8%	3.3%	1.5%	-0.2%	7.9%	1.7%	9.6%
Tipulidae (% of community)	Unnamed Reference Creek	4.3%	2.6%	1.2%	1.1%	7.6%	1.8%	8.5%
	CLT1 North Branch	16.9%	11.8%	5.3%	2.2%	31.6%	8.2%	37.2%
	CLT1 Upper Main Stem	0.5%	0.4%	0.2%	-0.1%	1.0%	0.0%	1.0%
	CLT1 Lower Main Stem	6.1%	3.4%	1.5%	1.9%	10.3%	2.3%	11.2%
Shredder FFG (% of community)	Unnamed Reference Creek	25.4%	3.2%	1.5%	21.4%	29.5%	20.4%	28.2%
	CLT1 North Branch	47.8%	14.0%	6.3%	30.5%	65.2%	32.0%	65.7%
	CLT1 Upper Main Stem	15.4%	2.1%	0.9%	12.8%	18.0%	13.5%	18.7%
	CLT1 Lower Main Stem	19.6%	9.5%	4.2%	7.8%	31.3%	10.6%	34.3%
Collector-Gatherer FFG (% of community)	Unnamed Reference Creek	53.9%	7.5%	3.4%	44.5%	63.2%	44.6%	64.6%
	CLT1 North Branch	40.8%	11.4%	5.1%	26.7%	54.9%	26.5%	56.7%
	CLT1 Upper Main Stem	29.6%	9.5%	4.3%	17.8%	41.4%	19.0%	42.1%
	CLT1 Lower Main Stem	73.8%	9.9%	4.4%	61.5%	86.0%	60.0%	83.4%
Filterer FFG (% of community)	Unnamed Reference Creek	2.9%	1.1%	0.5%	1.5%	4.2%	1.0%	3.8%
	CLT1 North Branch	0.5%	0.6%	0.3%	-0.2%	1.3%	0.0%	1.4%
	CLT1 Upper Main Stem	28.3%	13.7%	6.1%	11.2%	45.3%	14.2%	50.3%
	CLT1 Lower Main Stem	1.3%	1.5%	0.7%	-0.6%	3.2%	0.0%	3.9%
Clinger HPG (% of community)	Unnamed Reference Creek	41.0%	7.1%	3.2%	32.2%	49.8%	30.9%	47.0%
	CLT1 North Branch	41.7%	7.1%	3.2%	32.9%	50.5%	35.1%	52.4%
	CLT1 Upper Main Stem	38.8%	9.3%	4.2%	27.3%	50.3%	25.1%	48.6%
	CLT1 Lower Main Stem	18.6%	7.3%	3.2%	9.6%	27.6%	10.2%	28.8%
Sprawler HPG (% of community)	Unnamed Reference Creek	50.4%	8.8%	3.9%	39.5%	61.3%	39.4%	62.9%
	CLT1 North Branch	38.5%	10.5%	4.7%	25.5%	51.5%	25.6%	53.9%
	CLT1 Upper Main Stem	43.7%	13.9%	6.2%	26.5%	60.9%	28.5%	66.0%
	CLT1 Lower Main Stem	59.0%	12.2%	5.5%	43.9%	74.2%	42.9%	76.2%
Burrower HPG (% of community)	Unnamed Reference Creek	8.6%	3.6%	1.6%	4.2%	13.0%	5.9%	14.5%
	CLT1 North Branch	19.7%	11.1%	5.0%	5.9%	33.5%	11.0%	38.9%
	CLT1 Upper Main Stem	14.5%	8.8%	3.9%	3.6%	25.4%	4.0%	22.9%
	CLT1 Lower Main Stem	21.3%	5.1%	2.3%	15.0%	27.6%	13.6%	27.0%

Table F.7: Benthic invertebrate community statistical comparison results among Camp Lake Tributary 1 and Unnamed Reference Creek study areas for Functional Feeding Groups (FFG) and Habitat Preference Groups (HPG), Mary River Project CREMP, August 2016.

Metric	Overall four-group ANOVA[a]			ANOVA Comparison to Reference[b]				
	Significant Difference Among Areas?	p-value	Statistical Test	CLT1 Study Area	Significantly Different from Reference?	p-value	Magnitude of Difference (no. of SD)[c]	*Post-hoc* Statistical Test
Shredder FFG (% of community)	YES	0.0001	β , δ	Upstream (North Branch)	YES	0.0935	6.9	Tamhane's
				L2 (Upper Main Stem)	YES	0.0022	-3.1	
				Downstream (Lower Main Stem)	NO	0.7324	-	
Collector-Gatherer FFG (% of Community)	YES	0.0000	β , δ	Upstream (North Branch)	NO	0.2604	-	Tukey's HSD
				L2 (Upper Main Stem)	YES	0.0091	-3.2	
				Downstream (Lower Main Stem)	YES	0.0231	2.6	
Filterer FFG (% of community)	YES	0.0001	β , γ	Upstream (North Branch)	NO	0.2506	-	Tamhane's
				L2 (Upper Main Stem)	YES	0.0011	23.5	
				Downstream (Lower Main Stem)	NO	0.5598	-	
Clinger HPG (% of Community)	YES	0.0003	β , δ	Upstream (North Branch)	NO	0.9992	-	Tukey's HSD
				L2 (Upper Main Stem)	NO	0.9727	-	
				Downstream (Lower Main Stem)	YES	0.0010	-3.1	
Sprawler HPG (% of Community)	YES	0.0613	β , δ	Upstream (North Branch)	NO	0.3893	-	Tukey's HSD
				L2 (Upper Main Stem)	NO	0.7998	-	
				Downstream (Lower Main Stem)	NO	0.6310	-	
Burrower HPG (% of Community)	YES	0.0448	β , δ	Upstream (North Branch)	NO	0.1113	-	Tukey's HSD
				L2 (Upper Main Stem)	NO	0.6570	-	
				Downstream (Lower Main Stem)	YES	0.0491	3.6	

[a] Data analysis included: α - data untransformed; β - data probit transformed; δ - single factor ANOVA test conducted; γ - ANOVA test validated using Kruskal-Wallis H-test.

[b] Magnitude calculated by comparing the difference between the reference area and mine-exposed area means divided by the reference area standard deviation.

(shaded box) Highlighted values indicate significant differences among/between study areas based on ANOVA p-value less than 0.10 that were also outside of a Critical Effect Size of ±2 SD, suggesting an ecologically meaningful difference.

BOLD Bold text values indicate significant differences between study areas based on ANOVA p-value less than 0.10, but a CES within ±2 SD, suggesting the difference is not ecologically meaningful.

Table F.8: Statistical comparison of benthic metrics at Camp Lake Tributary 1 North Branch among years of mine operation (2015, 2016) and baseline (2007, 2011) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons [a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Density	NO	0.1735	α , ε	2007	2011	NO	0.8558	Tukey's HSD
				2007	2015	NO	0.2870	
				2007	2016	NO	0.1764	
				2011	2015	NO	0.7574	
				2011	2016	NO	0.5686	
				2015	2016	NO	0.9805	
Richness	NO	0.8860	α , ε	2007	2011	NO	0.9879	Tukey's HSD
				2007	2015	NO	0.8876	
				2007	2016	NO	0.9978	
				2011	2015	NO	0.9833	
				2011	2016	NO	0.9978	
				2015	2016	NO	0.9228	
Simpson's Evenness	YES	0.0029	α , ε	2007	2011	YES	0.0310	Tukey's HSD
				2007	2015	YES	0.0044	
				2007	2016	YES	0.0029	
				2011	2015	NO	0.8809	
				2011	2016	NO	0.7581	
				2015	2016	NO	0.9908	
Oligochaeta (% of community)	NO	0.8373	β , ε	2007	2011	NO	0.9972	Tamhane's
				2007	2015	NO	1.0000	
				2007	2016	NO	1.0000	
				2011	2015	NO	0.9257	
				2011	2016	NO	0.5340	
				2015	2016	NO	1.0000	
Hydracarina (% of community)	YES	0.0007	β , ε	2007	2011	NO	0.3452	Tamhane's
				2007	2015	NO	0.6633	
				2007	2016	YES	0.0113	
				2011	2015	NO	0.4038	
				2011	2016	NO	0.9238	
				2015	2016	YES	0.0209	
Chironomidae (% of community)	YES	0.0521	β , ε	2007	2011	NO	0.3448	Tukey's HSD
				2007	2015	NO	0.2189	
				2007	2016	YES	0.0330	
				2011	2015	NO	0.9994	
				2011	2016	NO	0.6045	
				2015	2016	NO	0.5691	
Metal Sensitive Taxa (% of community)	NO	0.6810	β , ε	2007	2011	NO	0.8250	Tukey's HSD
				2007	2015	NO	0.6294	
				2007	2016	NO	0.8848	
				2011	2015	NO	0.9939	
				2011	2016	NO	0.9952	
				2015	2016	NO	0.9407	
Tipulidae (% of community)	NO	0.2039	β , ε	2007	2011	NO	0.9883	Tukey's HSD
				2007	2015	NO	0.5036	
				2007	2016	NO	0.4948	
				2011	2015	NO	0.3243	
				2011	2016	NO	0.3174	
				2015	2016	NO	1.0000	

Table F.8: Statistical comparison of benthic metrics at Camp Lake Tributary 1 North Branch among years of mine operation (2015, 2016) and baseline (2007, 2011) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Collector-Gatherer FFG (% of community)	YES	0.0079	β , ε	2007	2011	YES	0.0171	Tukey's HSD
				2007	2015	YES	0.0590	
				2007	2016	YES	0.0072	
				2011	2015	NO	0.6773	
				2011	2016	NO	0.9999	
				2015	2016	NO	0.5283	
Shredder FFG (% of community)	YES	0.0528	β , ε	2007	2011	NO	0.3085	Tukey's HSD
				2007	2015	YES	0.0704	
				2007	2016	YES	0.0494	
				2011	2015	NO	0.8842	
				2011	2016	NO	0.7875	
				2015	2016	NO	0.9950	
Filterer FFG (% of community)	NO	0.1160	β , ε	2007	2011	NO	0.7043	Tamhane's
				2007	2015	NO	0.7043	
				2007	2016	NO	0.9739	
				2011	2015	NO	1.0000	
				2011	2016	NO	0.4989	
				2015	2016	NO	0.4989	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed; η - data log transformed; β - data logit transformed; ε - single factor ANOVA test conducted; γ - ANOVA validated using Kruskal-Wallis H-test.

Table F.9: Statistical comparison of benthic metrics at Camp Lake Tributary 1 Upper Main Stem (L2) between 2016 and baseline (2011) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Benthic Endpoint	Statistical Test Results			Summary Statistics						
	Significant Difference Between Years?	*p*-value	Statistical Analysis[a]	Year	N	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Density	NO	0.238	α , δ	2011	3	12,153	7,723	4,459	3,296	17,485
				2016	5	7,709	1,583	708	6,047	9,359
Richness	NO	0.194	α	2011	3	17.7	3.1	1.8	15.0	21.0
				2016	5	20.0	1.6	0.7	18.0	22.0
Simpson's Evenness	NO	0.321	α	2011	3	0.9	0.0	0.0	0.8	0.9
				2016	5	0.9	0.0	0.0	0.8	0.9
Oligochaeta (% of Community)	NO	0.191	β	2011	3	4.4	5.0	2.9	0.0	9.8
				2016	5	12.6	8.6	3.8	2.6	21.5
Hydracarina (% of Community)	NO	0.639	β	2011	3	19.0	19.8	11.4	1.1	40.3
				2016	5	23.8	8.3	3.7	11.7	33.2
Chironomidae (% of Community)	NO	0.338	β	2011	3	73.7	20.7	12.0	54.0	95.3
				2016	5	61.0	14.5	6.5	42.9	82.3
Metal Sensitive Taxa (% of Community)	NO	0.925	β	2011	3	28.8	22.6	13.0	13.0	54.7
				2016	5	30.0	12.4	5.6	17.1	50.3
Tipulidae (% of Community)	NO	0.375	β	2011	3	0.2	0.2	0.1	0.0	0.4
				2016	5	0.5	0.4	0.2	0.0	1.0
Shredder FFG (% of Community)	NO	0.984	β , δ	2011	3	29.5	9.2	5.3	23.6	40.1
				2016	5	29.6	9.5	4.3	19.0	42.1
Collector-Gatherer FFG (% of Community)	NO	0.719	β	2011	3	13.0	14.7	8.5	2.8	29.8
				2016	5	15.4	2.1	0.9	13.5	18.7
Filterer FFG (% of Community)	NO	0.971	β	2011	3	28.7	22.7	13.1	12.7	54.7
				2016	5	28.3	13.7	6.1	14.2	50.3

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted; γ - single factor ANOVA test results validated using Mann-Whitney U-test; and, δ - single-factor ANOVA test results validated using t-test assuming unequal variance.

Highlighted values indicate significant difference between lake depths based on ANOVA p-value less than 0.10.

Table F.10: Statistical comparison of benthic metrics at Camp Lake Tributary 1 Lower Main Stem among years of mine operation (2015, 2016) and baseline (2007, 2011) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons [a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Density	NO	0.3775	α , ε	2007	2011	NO	0.9786	Tukey's HSD
				2007	2015	NO	0.3811	
				2007	2016	NO	0.6465	
				2011	2015	NO	0.6217	
				2011	2016	NO	0.8760	
				2015	2016	NO	0.9433	
Richness	NO	0.1540	α , ε	2007	2011	NO	0.2900	Tukey's HSD
				2007	2015	NO	0.1302	
				2007	2016	NO	0.5257	
				2011	2015	NO	0.9895	
				2011	2016	NO	0.8962	
				2015	2016	NO	0.6619	
Simpson's Evenness	NO	0.9073	α , ε	2007	2011	NO	1.0000	Tukey's HSD
				2007	2015	NO	0.9470	
				2007	2016	NO	1.0000	
				2011	2015	NO	0.9452	
				2011	2016	NO	1.0000	
				2015	2016	NO	0.9214	
Oligochaeta (% of community)	YES	0.0594	β , ε	2007	2011	NO	0.2530	Tukey's HSD
				2007	2015	NO	0.9305	
				2007	2016	NO	0.8209	
				2011	2015	NO	0.4142	
				2011	2016	YES	0.0422	
				2015	2016	NO	0.3682	
Hydracarina (% of community)	YES	0.0000	β , ε	2007	2011	NO	0.1310	Tamhane's
				2007	2015	NO	0.9106	
				2007	2016	NO	0.6384	
				2011	2015	NO	0.1234	
				2011	2016	NO	0.1730	
				2015	2016	YES	0.0606	
Chironomidae (% of community)	YES	0.0073	β , ε	2007	2011	YES	0.0563	Tukey's HSD
				2007	2015	NO	0.7959	
				2007	2016	NO	0.4991	
				2011	2015	YES	0.0063	
				2011	2016	NO	0.3195	
				2015	2016	YES	0.0759	
Metal Sensitive Taxa (% of community)	YES	0.0877	β , ε	2007	2011	NO	0.9323	Tamhane's
				2007	2015	NO	0.7455	
				2007	2016	NO	0.7160	
				2011	2015	NO	0.9907	
				2011	2016	NO	0.9797	
				2015	2016	NO	0.9999	
Tipulidae (% of community)	YES	0.0857	β , ε	2007	2011	NO	0.8104	Tukey's HSD
				2007	2015	NO	0.3413	
				2007	2016	NO	0.9983	
				2011	2015	YES	0.0732	
				2011	2016	NO	0.6617	
				2015	2016	NO	0.3063	

Table F.10: Statistical comparison of benthic metrics at Camp Lake Tributary 1 Lower Main Stem among years of mine operation (2015, 2016) and baseline (2007, 2011) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test[b]	(I) Year	(J) Year	Significant Difference Between 2 Years?	p-value	Statistical Test
Collector-Gatherer FFG (% of community)	YES	0.0032	β , ε	2007	2011	NO	0.4807	Tukey's HSD
				2007	2015	YES	0.0760	
				2007	2016	NO	0.1635	
				2011	2015	YES	0.0043	
				2011	2016	YES	0.0097	
				2015	2016	NO	0.9473	
Shredder FFG (% of community)	YES	0.0210	β , ε	2007	2011	YES	0.0920	Tukey's HSD
				2007	2015	NO	0.9610	
				2007	2016	NO	0.9696	
				2011	2015	YES	0.0234	
				2011	2016	YES	0.0252	
				2015	2016	NO	1.0000	
Filterer FFG (% of community)	NO	0.1037	β , ε	2007	2011	NO	0.9012	Tamhane's
				2007	2015	NO	0.8986	
				2007	2016	NO	0.9311	
				2011	2015	NO	0.9999	
				2011	2016	NO	0.7614	
				2015	2016	NO	0.7124	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed; η - data log transformed; β - data logit transformed; ε - single factor ANOVA test conducted; γ - ANOVA validated using Kruskal-Wallis H-test.

Table F.11: Benthic station habitat feature statistical comparisons among Camp Lake Tributary 2 and Unnamed Reference Creek study areas, Mary River Project CREMP, August 2016. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Areas?	p-value	Statistical Test [b]	(I) Area	(J) Area	Significant Difference Between 2 Areas?	p-value	Statistical Test
Water Depth (cm)	NO	0.4864	α	Unnamed Reference Creek	CLT2 Upstream	NO	0.9873	Tamhane's
				Unnamed Reference Creek	CLT2 Downstream	NO	0.8173	
				CLT2 Upstream	CLT2 Downstream	NO	0.4596	
Water Velocity (cm/s)	YES	0.0097	α	Unnamed Reference Creek	CLT2 Upstream	YES	0.0133	Tamhane's
				Unnamed Reference Creek	CLT2 Downstream	YES	0.0665	
				CLT2 Upstream	CLT2 Downstream	NO	0.6665	
Substrate Size (cm diameter)	YES	0.0089	α	Unnamed Reference Creek	CLT2 Upstream	NO	0.9328	Tukey's HSD
				Unnamed Reference Creek	CLT2 Downstream	YES	0.0235	
				CLT2 Upstream	CLT2 Downstream	YES	0.0124	
Substrate Embeddedness (%)	NO	0.1890	ζ	Unnamed Reference Creek	CLT2 Upstream	NO	0.3191	Tamhane's
				Unnamed Reference Creek	CLT2 Downstream	NO	0.5644	
				CLT2 Upstream	CLT2 Downstream	NO	0.8328	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data logit transformed, single factor ANOVA test conducted;

Table F.12: Benthic invertebrate community data for Camp Lake Tributary 2 study areas, August 2016. Densities expressed in number of organisms per square meter.

Station	Camp Lake Tributary 2 - Upstream (CLT2-US)					Camp Lake Tributary 2 - Downstream (CLT2-DS)				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
ROUNDWORMS										
P. Nemata	0	4	4	7	4	4	0	4	0	11
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Enchytraeidae	4	4	29	29	29	0	0	0	22	4
F. Naididae										
S.F. Tubificinae										
immatures with hair chaetae	0	4	0	0	0	0	0	0	0	0
F. Lumbriculidae										
Lumbriculus	0	0	0	0	0	0	0	0	0	0
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina	0	0	0	0	0	0	0	0	0	0
F. Hygrobatidae										
Hygrobates	0	0	0	0	0	0	0	0	0	0
F. Lebertiidae										
Lebertia	0	0	0	0	0	0	0	0	4	0
F. Sperchonidae										
Sperchon	7	25	22	29	29	11	11	7	7	4
HARPACTICOIDS										
O. Harpacticoida	0	0	0	0	0	0	0	0	0	0
SEED SHRIMPS										
Cl. Ostracoda	0	0	0	0	0	0	0	0	0	0
SPRINGTAILS										
Cl. Entognatha										
O. Collembola	0	0	0	0	0	0	0	0	0	4
INSECTS										
Cl. Insecta										
MAYFLIES										
O. Ephemeroptera										
F. Baetidae										
Acentrella feropagus	0	0	0	0	0	0	0	0	0	4
STONEFLIES										
O. Plecoptera										
F. Capniidae										
immature	4	18	0	14	22	0	4	4	11	0
TRUE FLIES										
O. Diptera										
BITING-MIDGE										
F. Ceratopogonidae										
Culicoides	4	0	0	4	4	0	0	0	4	4
indeterminate	0	0	0	0	0	0	0	0	0	0
MIDGES										
F. Chironomidae										
chironomid pupae	**4**	**29**	**22**	**11**	**7**	**4**	**0**	0	**7**	**4**
S.F. Chironominae										
Cladotanytarsus	0	0	0	0	0	0	0	0	0	0
Micropsectra	0	0	0	0	0	4	0	0	0	0
Paratanytarsus	0	0	0	0	0	0	0	0	0	0
Rheotanytarsus	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0	0	0	0
S.F. Diamesinae										
Diamesa	14	7	14	0	14	4	7	4	7	0
Pseudokiefferiella	4	0	11	11	36	7	0	4	7	11
S.F. Orthocladiinae										

Table F.12: Benthic invertebrate community data for Camp Lake Tributary 2 study areas, August 2016. Densities expressed in number of organisms per square meter.

Station	Camp Lake Tributary 2 - Upstream (CLT2-US)					Camp Lake Tributary 2 - Downstream (CLT2-DS)				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
Chaetocladius	4	11	7	11	7	0	7	0	0	4
Corynoneura	4	0	0	0	4	0	0	0	0	0
Cricotopus	65	57	111	57	39	11	0	0	47	11
Cricotopus/Orthocladius	0	7	11	4	7	0	0	0	0	32
Diplocladius	0	0	0	0	0	0	0	0	0	0
Doncricotopus	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	25	4	29	0	32	0	29	14	47	0
Hydrobaenus	0	4	0	0	4	4	0	0	0	0
Hydrosmittia	0	14	11	0	0	0	4	0	0	4
Krenosmittia	14	11	0	0	11	0	0	0	0	0
Limnophyes	4	4	4	0	7	7	4	18	11	0
Metriocnemus	0	0	0	0	0	0	0	0	0	0
Nanocladius	0	0	0	0	0	0	0	0	0	0
Orthocladius (Euorthocladius)	68	86	57	36	65	11	29	18	22	11
Parakiefferiella	0	0	0	0	0	0	0	0	0	0
Paraphaenocladius	0	0	0	0	0	4	0	0	0	0
Synorthocladius	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	4	0	0	4	0
Tokunagaia	65	179	97	75	122	122	54	79	90	54
Tvetenia	0	7	7	4	4	7	0	0	0	4
indeterminate	0	0	0	0	0	0	0	0	0	0
S.F. Tanypodinae										
Procladius	0	0	0	0	0	0	0	0	0	0
Thienemannimyia complex	0	0	0	0	0	0	0	0	4	0
F. Empididae										
Clinocera	4	4	11	0	4	14	0	0	0	4
pupae	0	0	0	0	4	0	0	0	0	**0**
F. Ephydridae	0	4	0	0	0	0	0	4	0	4
F. Muscidae	0	0	0	0	0	0	0	0	0	4
F. Simuliidae										
Gymnopais	0	0	0	0	0	0	0	0	0	0
Prosimulium	0	0	4	0	0	0	0	0	0	4
pupae	0	0	0	0	0	0	0	0	4	0
F. Tipulidae										
Tipula	7	22	11	14	32	7	0	7	4	4
Number of Organisms (No. organisms per m^2)	301	505	462	306	487	225	149	163	302	186
Richness (total number of taxa)[a]	16	20	17	13	20	15	9	11	16	19
Simpson's Evenness (E)	0.893	0.841	0.906	0.924	0.928	0.717	0.878	0.799	0.892	0.902
Bray-Curtis Index	0.830	0.685	0.673	0.751	0.694	0.785	0.921	0.880	0.799	0.836
Percent Composition										
% Nemata	0.0%	0.8%	0.9%	2.3%	0.8%	1.8%	0.0%	2.5%	0.0%	5.9%
% Oligochaeta	1.3%	1.6%	6.3%	9.5%	6.0%	0.0%	0.0%	0.0%	7.3%	2.2%
% Hydracarina	2.3%	5.0%	4.8%	9.5%	6.0%	4.9%	7.4%	4.3%	3.6%	2.2%
% Ostracods	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% Chironomids	90.0%	83.2%	82.5%	68.3%	73.7%	84.0%	89.9%	84.0%	81.5%	72.6%
% Metal Sensitive Chironmids	6.0%	1.4%	5.4%	3.6%	10.3%	6.7%	4.7%	4.9%	4.6%	5.9%
% Tipulidae	2.3%	4.4%	2.4%	4.6%	6.6%	3.1%	0.0%	4.3%	1.3%	2.2%
Functional Feeding Group Composition										
% Shredders	25.6%	22.4%	30.5%	30.1%	20.7%	8.0%	2.7%	9.2%	21.2%	28.0%
% Collector - Gatherers	69.4%	71.9%	61.5%	59.2%	70.8%	79.1%	89.9%	86.5%	71.2%	61.3%
% Filterers	0.0%	0.0%	0.9%	0.0%	0.0%	1.8%	0.0%	0.0%	1.3%	2.2%
Habitat Preference Group Composition										
% Clingers	25.6%	19.4%	36.1%	30.4%	17.2%	16.0%	7.4%	4.3%	21.2%	30.1%
% Sprawlers	69.4%	73.1%	54.3%	52.0%	68.6%	79.1%	92.6%	86.5%	68.9%	53.2%
% Burrowers	5.0%	7.5%	9.5%	17.6%	14.2%	4.9%	0.0%	9.2%	9.9%	14.5%

[a] Bold entries excluded from taxa count

Table F.13: Benthic invertebrate community summary statistics for Camp Lake Tributary 2 study areas, Mary River Project CREMP, August 2016. Sample size equals five for all study areas.

Metric	Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Density (no. organisms / m^2)	Unnamed Reference Creek	1,645	619	277	876	2,414	670	2,179
	CLT2 Upstream	412	100	45	288	537	301	505
	CLT2 Downstream	205	61	27	129	281	149	302
Richness (Number of Taxa)	Unnamed Reference Creek	18.6	0.9	0.4	17.5	19.7	17.0	19.0
	CLT2 Upstream	17.2	2.9	1.3	13.5	20.9	13.0	20.0
	CLT2 Downstream	14.0	4.0	1.8	9.0	19.0	9.0	19.0
Simpson's Evenness	Unnamed Reference Creek	0.873	0.070	0.031	0.786	0.960	0.764	0.940
	CLT2 Upstream	0.898	0.035	0.016	0.855	0.942	0.841	0.928
	CLT2 Downstream	0.838	0.079	0.035	0.740	0.936	0.717	0.902
Bray-Curtis Index	Unnamed Reference Creek	0.237	0.130	0.058	0.076	0.398	0.092	0.437
	CLT2 Upstream	0.726	0.065	0.029	0.646	0.807	0.673	0.830
	CLT2 Downstream	0.844	0.056	0.025	0.774	0.914	0.785	0.921
Oligochaeta (% of community)	Unnamed Reference Creek	2.5%	0.5%	0.2%	1.9%	3.2%	2.0%	3.3%
	CLT2 Upstream	4.9%	3.5%	1.5%	0.6%	9.2%	1.3%	9.5%
	CLT2 Downstream	1.9%	3.2%	1.4%	-2.0%	5.8%	0.0%	7.3%
Hydracarina (% of community)	Unnamed Reference Creek	11.7%	3.8%	1.7%	7.1%	16.4%	9.0%	18.2%
	CLT2 Upstream	5.5%	2.6%	1.2%	2.3%	8.7%	2.3%	9.5%
	CLT2 Downstream	4.5%	1.9%	0.9%	2.1%	6.9%	2.2%	7.4%
Chironomidae (% of community)	Unnamed Reference Creek	70.8%	9.2%	4.1%	59.4%	82.2%	56.6%	81.4%
	CLT2 Upstream	79.5%	8.5%	3.8%	68.9%	90.1%	68.3%	90.0%
	CLT2 Downstream	82.4%	6.3%	2.8%	74.6%	90.2%	72.6%	89.9%
Metal-Sensitive Chironomidae (% of community)	Unnamed Reference Creek	8.9%	5.9%	2.7%	1.6%	16.3%	4.6%	19.3%
	CLT2 Upstream	5.3%	3.3%	1.5%	1.2%	9.4%	1.4%	10.3%
	CLT2 Downstream	5.4%	0.9%	0.4%	4.3%	6.5%	4.6%	6.7%
Tipulidae (% of community)	Unnamed Reference Creek	4.3%	2.6%	1.2%	1.1%	7.6%	1.8%	8.5%
	CLT2 Upstream	4.0%	1.8%	0.8%	1.8%	6.2%	2.3%	6.6%
	CLT2 Downstream	2.2%	1.6%	0.7%	0.1%	4.2%	0.0%	4.3%
Shredder FFG (% of community)	Unnamed Reference Creek	25.4%	3.2%	1.5%	21.4%	29.5%	20.4%	28.2%
	CLT2 Upstream	25.9%	4.4%	2.0%	20.4%	31.3%	20.7%	30.5%
	CLT2 Downstream	13.8%	10.4%	4.7%	0.9%	26.7%	2.7%	28.0%
Collector-Gatherer FFG (% of community)	Unnamed Reference Creek	53.9%	7.5%	3.4%	44.5%	63.2%	44.6%	64.6%
	CLT2 Upstream	66.6%	5.8%	2.6%	59.3%	73.8%	59.2%	71.9%
	CLT2 Downstream	77.6%	11.6%	5.2%	63.2%	92.0%	61.3%	89.9%
Filterer FFG (% of community)	Unnamed Reference Creek	2.9%	1.1%	0.5%	1.5%	4.2%	1.0%	3.8%
	CLT2 Upstream	0.2%	0.4%	0.2%	-0.3%	0.7%	0.0%	0.9%
	CLT2 Downstream	1.1%	1.0%	0.4%	-0.2%	2.3%	0.0%	2.2%
Clinger HPG (% of community)	Unnamed Reference Creek	41.0%	7.1%	3.2%	32.2%	49.8%	30.9%	47.0%
	CLT2 Upstream	25.8%	7.8%	3.5%	16.1%	35.4%	17.2%	36.1%
	CLT2 Downstream	15.8%	10.5%	4.7%	2.8%	28.8%	4.3%	30.1%
Sprawler HPG (% of community)	Unnamed Reference Creek	50.4%	8.8%	3.9%	39.5%	61.3%	39.4%	62.9%
	CLT2 Upstream	63.5%	9.6%	4.3%	51.5%	75.4%	52.0%	73.1%
	CLT2 Downstream	76.1%	15.5%	6.9%	56.8%	95.4%	53.2%	92.6%
Burrower HPG (% of community)	Unnamed Reference Creek	8.6%	3.6%	1.6%	4.2%	13.0%	5.9%	14.5%
	CLT2 Upstream	10.8%	5.1%	2.3%	4.4%	17.1%	5.0%	17.6%
	CLT2 Downstream	7.7%	5.5%	2.5%	0.9%	14.5%	0.0%	14.5%

Table F.14: Benthic invertebrate community statistical comparison results among Camp Lake Tributary 2 and Unnamed Reference Creek study areas for Functional Feeding Groups (FFG) and Habitat Preference Groups (HPG), Mary River Project CREMP, August 2016.

Season	Overall 3-group Comparison			Summary		Pair-wise, post-hoc comparisons[a]					
	Significant Difference Among Areas?	p-value	Statistical Test[b]	Area	Mean Value	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Magnitude of Difference	Statistical Test
Shredder FFG (% of community)	YES	0.03190	α	Reference	25.4%	Reference	CLT2 US	NO	0.9971	-	Tamhane's (β)
				CLT2 Upstream	25.9%	Reference	CLT2 DS	NO	0.2465	-	
				CLT2 Downstream	13.8%	CLT2 US	CLT2 DS	NO	0.2325	-	
Collector-Gatherer FFG (% of Community)	YES	0.00555	α	Reference	53.9%	Reference	CLT2 US	NO	0.2080	-	Tukey's (β)
				CLT2 Upstream	66.6%	Reference	CLT2 DS	YES	0.0042	3.1	
				CLT2 Downstream	77.6%	CLT2 US	CLT2 DS	NO	0.1033	-	
Filterer FFG (% of community)	YES	0.00131	α , γ	Reference	2.9%	Reference	CLT2 US	YES	0.0010	-2.5	Tukey's (β)
				CLT2 Upstream	0.2%	Reference	CLT2 DS	NO	0.1691	-	
				CLT2 Downstream	1.1%	CLT2 US	CLT2 DS	YES	0.0303	2.3	
Clinger HPG (% of Community)	YES	0.00661	α	Reference	41.0%	Reference	CLT2 US	YES	0.0465	-2.1	Tamhane's (β)
				CLT2 Upstream	25.8%	Reference	CLT2 DS	YES	0.0509	-3.5	
				CLT2 Downstream	15.8%	CLT2 US	CLT2 DS	NO	0.3474	-	
Sprawler HPG (% of Community)	YES	0.01866	α	Reference	50.4%	Reference	CLT2 US	NO	0.3763	-	Tukey's (β)
				CLT2 Upstream	63.5%	Reference	CLT2 DS	YES	0.0149	2.9	
				CLT2 Downstream	76.1%	CLT2 US	CLT2 DS	NO	0.1659	-	
Burrower HPG (% of Community)	NO	0.47998	α	Reference	8.6%	Reference	CLT2 US	NO	0.9333	-	Tukey's (β)
				CLT2 Upstream	10.8%	Reference	CLT2 DS	NO	0.6743	-	
				CLT2 Downstream	7.7%	CLT2 US	CLT2 DS	NO	0.4672	-	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log transformed, single factor ANOVA test conducted; γ - data non-normal, test results validated using Kruskal-Wallis H-test (multiple group comparison) or Mann-Whitney U-test (pair-wise comparison), as appropriate.

Shaded values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table F.15: Statistical comparison of benthic metrics at Camp Lake Tributary 2 Upstream among years of mine operation (2015, 2016) and baseline (2007) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between 2 Yearss?	p-value	Statistical Test
Density	NO	0.1510	α	2007	2015	NO	0.2163	Tukey's HSD
				2007	2016	NO	0.9711	
				2015	2016	NO	0.2122	
Richness	YES	0.0029	α	2007	2015	YES	0.0022	Tukey's HSD
				2007	2016	YES	0.0613	
				2015	2016	YES	0.0870	
Simpson's Evenness	YES	0.0023	α	2007	2015	YES	0.0019	Tukey's HSD
				2007	2016	YES	0.0115	
				2015	2016	NO	0.4103	
Oligochaeta (% of Community)	NO	0.3437	β	2007	2015	NO	0.9620	Tukey's HSD
				2007	2016	NO	0.4002	
				2015	2016	NO	0.4501	
Hydracarina (% of Community)	YES	0.0128	β	2007	2015	NO	0.3621	Tukey's HSD
				2007	2016	NO	0.2205	
				2015	2016	YES	0.0100	
Chironomidae (% of Community)	NO	0.3115	β	2007	2015	NO	0.3765	Tukey's HSD
				2007	2016	NO	0.3266	
				2015	2016	NO	0.9912	
Metal Sensitive Taxa (% of Community)	NO	0.1427	β	2007	2015	NO	0.2513	Tukey's HSD
				2007	2016	NO	1.0000	
				2015	2016	NO	0.1709	
Tipulidae (% of Community)	NO	0.8072	β	2007	2015	NO	0.8402	Tukey's HSD
				2007	2016	NO	0.8125	
				2015	2016	NO	0.9979	
Collector-Gatherer FFG (% of Community)	NO	0.8945	β	2007	2015	NO	0.9249	Tukey's HSD
				2007	2016	NO	0.8908	
				2015	2016	NO	0.9949	
Shredder FFG (% of Community)	NO	0.7165	β	2007	2015	NO	0.7096	Tukey's HSD
				2007	2016	NO	0.9396	
				2015	2016	NO	0.8548	
Filterer FFG (% of Commmunity)	NO	0.2245	β	2007	2015	NO	0.3947	Tukey's HSD
				2007	2016	NO	0.9890	
				2015	2016	NO	0.2391	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted;

Table F.16: Statistical comparison of benthic metrics at Camp Lake Tributary 2 Downstream among years of mine operation (2015, 2016) and baseline (2007) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between 2 Yearss?	p-value	Statistical Test
Density	NO	0.1071	α	2007	2015	NO	0.9912	Tukey's HSD
				2007	2016	NO	0.2282	
				2015	2016	NO	0.1211	
Richness	NO	0.3267	α	2007	2015	NO	0.3844	Tukey's HSD
				2007	2016	NO	0.3472	
				2015	2016	NO	0.9953	
Simpson's Evenness	YES	0.0516	α	2007	2015	YES	0.0267	Tamhane's
				2007	2016	NO	0.8756	
				2015	2016	NO	0.1414	
Oligochaeta (% of Community)	NO	0.4060	β	2007	2015	NO	0.5799	Tukey's HSD
				2007	2016	NO	0.9930	
				2015	2016	NO	0.4207	
Hydracarina (% of Community)	YES	0.0023	β	2007	2015	NO	0.3316	Tukey's HSD
				2007	2016	YES	0.0555	
				2015	2016	YES	0.0018	
Chironomidae (% of Community)	NO	0.1532	β	2007	2015	NO	0.1432	Tukey's HSD
				2007	2016	NO	0.6286	
				2015	2016	NO	0.4168	
Metal Sensitive Taxa (% of Community)	NO	0.3674	β	2007	2015	NO	0.9716	Tukey's HSD
				2007	2016	NO	0.4310	
				2015	2016	NO	0.4650	
Tipulidae (% of Community)	NO	0.3488	β	2007	2015	NO	0.9809	Tukey's HSD
				2007	2016	NO	0.4251	
				2015	2016	NO	0.4324	
Collector-Gatherer FFG (% of Community)	NO	0.2260	β	2007	2015	NO	0.8397	Tukey's HSD
				2007	2016	NO	0.5767	
				2015	2016	NO	0.2053	
Shredder FFG (% of Community)	NO	0.3583	β	2007	2015	NO	0.9340	Tukey's HSD
				2007	2016	NO	0.3935	
				2015	2016	NO	0.4961	
Filterer FFG (% of Commmunity)	NO	0.1150	β	2007	2015	NO	0.1134	Tukey's HSD
				2007	2016	NO	0.1874	
				2015	2016	NO	0.9247	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted;

Table F.17: Benthic invertebrate community data for Reference Lake 3, August 2016. Densities expressed in number of organisms per square meter.

Station	Reference Lake 03 - Littoral Stations 2016					Reference Lake 03 - Profundal Stations 2016				
Replicate	REF-01	REF-02	REF-03	REF-04	REF-05	REF-06	REF-07	REF-08	REF-09	REF-10
ROUNDWORMS										
P. Nemata	26	0	121	112	9	0	0	0	0	0
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Lumbriculidae										
Lumbriculus	0	0	0	0	0	0	0	0	0	0
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
immature	**9**	**34**	0	0	0	0	0	0	0	0
F. Acalyptonotidae										
Acalyptonotus	52	0	34	17	17	9	0	9	0	9
F. Hygrobatidae										
Hygrobates	0	0	0	0	0	0	0	0	0	0
F. Lebertiidae										
Lebertia	0	138	26	26	26	9	0	9	0	0
HARPACTICOIDS										
O. Harpacticoida	0	0	0	0	0	0	0	0	0	0
SEED SHRIMPS										
Cl. Ostracoda	1,241	1,655	371	1,836	457	17	17	34	34	26
WATER SCUDS										
O. Amphipoda										
F. Hyalellidae										
Hyalella	0	0	0	0	0	0	0	0	0	0
INSECTS										
Cl. Insecta										
CADDISFLIES										
O. Trichoptera										
F. Apataniidae										
Apatania	0	34	0	0	0	0	0	0	0	0
TRUE FLIES										
O. Diptera										
MIDGES										
F. Chironomidae										
chironomid pupae	**9**	**34**	**9**	0	0	0	0	0	0	0
S.F. Chironominae										
Chironomus	0	0	0	0	0	0	0	0	0	0
Micropsectra	716	828	86	164	172	0	0	0	0	0
Parachironomus	0	0	0	0	0	0	0	0	0	0
Paratanytarsus	17	138	0	0	0	0	0	0	0	0
Sergentia	17	0	0	0	0	0	0	0	0	0
Stictochironomus	440	690	0	0	216	9	0	0	0	0
Tanytarsus	121	0	0	0	0	0	0	0	0	0
S.F. Diamesinae										
Diamesa	0	69	17	17	43	0	0	0	0	9
Pseudodiamesa	0	138	34	0	9	0	17	9	0	0
S.F. Orthocladiinae										
Abiskomyia	190	207	43	60	181	0	0	0	0	0
Cricotopus/Orthocladius	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	52	0	112	69	26	388	371	345	509	414
Paracladius	17	34	9	17	9	0	0	0	0	0
Parakiefferiella	0	0	0	0	0	0	0	0	0	0
Psectrocladius	0	0	0	0	0	0	0	0	0	0
Zalutschia	310	207	26	26	43	9	9	0	0	0
Genus *"Greenland"*	0	0	0	0	0	0	0	0	0	0

Table F.17: Benthic invertebrate community data for Reference Lake 3, August 2016. Densities expressed in number of organisms per square meter.

Station	Reference Lake 03 - Littoral Stations 2016					Reference Lake 03 - Profundal Stations 2016				
Replicate	REF-01	REF-02	REF-03	REF-04	REF-05	REF-06	REF-07	REF-08	REF-09	REF-10
S.F. Tanypodinae										
Arctopelopia	17	34	0	0	0	0	0	0	0	0
Procladius	17	0	9	9	0	0	0	0	0	0
CRANE FLIES										
F. Tipulidae										
Dicranota	0	0	0	0	0	0	0	0	0	0
Density (No. organisms per m^2)	3,251	4,240	897	2,353	1,208	441	414	406	543	458
Richness (total number of taxa)[a]	14	12	12	11	12	6	4	5	2	4
Simpson's Evenness (E)	0.831	0.842	0.848	0.420	0.849	0.267	0.257	0.337	0.235	0.239
Bray-Curtis Index	0.249	0.382	0.527	0.245	0.267	0.042	0.073	0.083	0.143	0.040
Percent Composition										
% Nemata	0.8%	0.0%	13.5%	4.8%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%
% Hydracarina	1.9%	4.1%	6.7%	1.8%	3.6%	4.1%	0.0%	4.4%	0.0%	2.0%
% Ostracods	38.2%	39.0%	41.4%	78.0%	37.8%	3.9%	4.1%	8.4%	6.3%	5.7%
% Chironomids	59.2%	56.1%	38.5%	15.4%	57.9%	92.1%	95.9%	87.2%	93.7%	92.4%
% Metal Sensitive Chironmids	26.4%	28.1%	15.6%	7.7%	18.5%	0.0%	4.1%	2.2%	0.0%	2.0%
Functional Feeding Group Composition										
% Shredders	9.6%	5.0%	3.0%	1.1%	3.6%	2.0%	2.2%	0.0%	0.0%	0.0%
% Collector - Gatherers	61.1%	66.3%	79.5%	89.7%	78.6%	93.9%	97.8%	95.6%	100.0%	98.0%
% Filterers	26.4%	23.1%	9.8%	7.0%	14.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Habitat Preference Group Composition										
% Clingers	28.3%	24.7%	16.5%	8.8%	17.8%	4.1%	0.0%	4.4%	0.0%	2.0%
% Sprawlers	57.3%	57.2%	68.1%	85.7%	60.0%	93.9%	100.0%	95.6%	100.0%	96.1%
% Burrowers	14.4%	18.2%	15.4%	5.5%	22.2%	2.0%	0.0%	0.0%	0.0%	2.0%

[a] Bold entries excluded from taxa count

Table F.18: Benthic invertebrate community data for Camp Lake, August 2016. Densities expressed in number of organisms per square meter.

Station	Camp Lake - Littoral Stations 2016				
Replicate	JLO-2	JLO-21	JLO-30	JLO-31	JLO-32
ROUNDWORMS					
P. Nemata	34	34	259	121	34
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Lumbriculidae					
Lumbriculus	34	0	0	17	103
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
immature	**0**	**0**	17	0	0
F. Acalyptonotidae					
Acalyptonotus	0	0	69	17	0
F. Hygrobatidae					
Hygrobates	0	0	17	0	34
F. Lebertiidae					
Lebertia	0	0	52	52	0
HARPACTICOIDS					
O. Harpacticoida	34	0	0	69	103
SEED SHRIMPS					
Cl. Ostracoda	69	0	34	52	69
WATER SCUDS					
O. Amphipoda					
F. Hyalellidae					
Hyalella	0	0	0	0	0
INSECTS					
Cl. Insecta					
CADDISFLIES					
O. Trichoptera					
F. Apataniidae					
Apatania	34	103	17	0	0
TRUE FLIES					
O. Diptera					
MIDGES					
F. Chironomidae					
chironomid pupae	**414**	**0**	**0**	34	0
S.F. Chironominae					
Chironomus	34	0	0	0	207
Micropsectra	138	483	707	241	552
Parachironomus	0	0	0	0	0
Paratanytarsus	207	241	34	138	103
Sergentia	345	0	0	34	690
Stictochironomus	345	1,138	138	241	517
Tanytarsus	0	0	52	52	207
S.F. Diamesinae					
Diamesa	0	0	17	17	172
Pseudodiamesa	0	0	207	86	69
S.F. Orthocladiinae					
Abiskomyia	207	276	224	224	69
Cricotopus/Orthocladius	103	0	0	17	0
Heterotrissocladius	414	862	224	310	241
Paracladius	0	0	34	0	0
Parakiefferiella	0	0	0	0	0
Psectrocladius	0	0	0	0	0
Zalutschia	0	69	52	86	69
Genus *"Greenland"*	34	34	0	0	0

Table F.18: Benthic invertebrate community data for Camp Lake, August 2016. Densities expressed in number of organisms per square meter.

Station	Camp Lake - Littoral Stations 2016				
Replicate	JLO-2	JLO-21	JLO-30	JLO-31	JLO-32
S.F. Tanypodinae					
Arctopelopia	69	103	0	17	34
Procladius	34	0	17	0	0
CRANE FLIES					
F. Tipulidae					
Dicranota	34	0	0	0	0
Density (No. organisms per m^2)	2,583	3,343	2,171	1,825	3,273
Richness (total number of taxa)[a]	17	10	17	18	17
Simpson's Evenness (E)	0.935	0.869	0.894	0.951	0.936
Bray-Curtis Index	0.679	0.737	0.649	0.576	0.744
Percent Composition					
% Nemata	1.3%	1.0%	11.9%	6.6%	1.0%
% Hydracarina	0.0%	0.0%	7.1%	3.8%	1.0%
% Ostracods	2.7%	0.0%	1.6%	2.8%	2.1%
% Chironomids	90.7%	95.9%	78.6%	82.0%	89.5%
% Metal Sensitive Chironmids	16.2%	21.7%	46.8%	29.9%	33.7%
Functional Feeding Group Composition					
% Shredders	4.8%	2.1%	2.4%	5.8%	2.1%
% Collector - Gatherers	71.5%	70.1%	52.4%	65.3%	69.5%
% Filterers	16.2%	21.7%	36.5%	24.2%	26.3%
Habitat Preference Group Composition					
% Clingers	28.9%	17.5%	42.9%	23.1%	45.3%
% Sprawlers	49.8%	47.4%	38.0%	54.8%	23.1%
% Burrowers	20.4%	35.1%	19.1%	22.0%	31.6%

[a] Bold entries excluded from taxa count

Table F.19: Statistical comparison of benthic metrics at Camp Lake littoral stations among years of mine operation (2015, 2016) and baseline (2007) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Summary Statistics		Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	Year	Mean	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	NO	0.2484	α , ζ	2007	7,752	2007	2015	NO	0.3222	Tamhane's
				2015	3,671	2007	2016	NO	0.2082	
				2016	2,639	2015	2016	NO	0.6598	
Richness	NO	0.1803	η , ζ	2007	18.0	2007	2015	NO	0.1700	Tukey's HSD
				2015	12.8	2007	2016	NO	0.7622	
				2016	15.8	2015	2016	NO	0.4148	
Simpson's Evenness	YES	0.0001	α	2007	0.893	2007	2015	YES	0.0007	Tukey's HSD
				2015	0.712	2007	2016	NO	0.7754	
				2016	0.917	2015	2016	YES	0.0002	
Nemata (% of Community)	NO	0.8148	β	2007	5.6%	2007	2015	NO	0.9371	Tukey's HSD
				2015	4.7%	2007	2016	NO	0.7984	
				2016	4.4%	2015	2016	NO	0.9454	
Ostracoda (% of Community)	NO	0.2271	β , ζ	2007	0.7%	2007	2015	NO	0.6444	Tukey's HSD
				2015	0.2%	2007	2016	NO	0.6949	
				2016	1.8%	2015	2016	NO	0.2009	
Chironomidae (% of Community)	NO	0.2847	β , ζ	2007	90.1%	2007	2015	NO	0.5210	Tukey's HSD
				2015	93.1%	2007	2016	NO	0.9096	
				2016	87.4%	2015	2016	NO	0.2738	
Metal Sensitive Taxa (% of Community)	NO	0.9555	β	2007	30.8%	2007	2015	NO	0.9706	Tukey's HSD
				2015	38.5%	2007	2016	NO	0.9995	
				2016	29.7%	2015	2016	NO	0.9579	
Collector-Gatherer FFG (% of Community)	NO	0.1875	β	2007	55.9%	2007	2015	NO	0.8245	Tukey's HSD
				2015	51.1%	2007	2016	NO	0.4576	
				2016	65.7%	2015	2016	NO	0.1724	
Filterer FFG (% of Commmunity)	NO	0.8283	β	2007	30.8%	2007	2015	NO	0.9963	Tamhane's
				2015	38.2%	2007	2016	NO	0.9400	
				2016	25.0%	2015	2016	NO	0.9327	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted;

Table F.20: Replicate grab data for benthic invertebrate community samples collected at the Sheardown Lake Tributaries, Mary River Project CREMP, August 2016.

Study Area	Station	Water Depth (cm)			Water Velocity (m/s)			Substrate Size[a] (cm)			Embeddedness		
		Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3
Reference Creek	REF CRK B1	12	10	12	0.38	0.28	0.23	8.8	6.6	6.9	25%	25%	25%
	REF CRK B2	12	16	16	0.24	0.44	0.28	6.9	9.1	6.2	25%	25%	25%
	REF CRK B3	12	10	10	0.37	0.31	0.22	7.3	7.0	8.4	25%	25%	25%
	REF CRK B4	16	18	12	0.38	0.34	0.28	6.8	6.3	6.7	25%	25%	25%
	REF CRK B5	12	12	8	0.26	0.21	0.25	5.3	6.0	6.4	25%	25%	25%
Sheardown Tributary 1 Reach 1	SDLT1 R1 B1	10	10	14	0.42	0.29	0.31	8.4	7.3	6.0	50%	50%	-
	SDLT1 R1 B2	8	10	12	0.29	0.30	0.29	6.2	6.7	8.8	50%	50%	50%
	SDLT1 R1 B3	12	12	8	0.56	0.51	0.45	6.5	10.1	7.0	75%	75%	75%
	SDLT1 R1 B4	10	8	10	0.55	0.42	0.50	7.0	8.1	9.2	50%	50%	50%
	SDLT1 R1 B5	8	8	12	0.36	0.42	0.28	6.7	8.8	6.2	25%	25%	25%
Sheardown Tributary 9	SDLT 9 DS B1	2	2	2	0.20	0.22	0.22	9.0	6.1	6.2	50%	50%	50%
	SDLT 9 DS B2	6	2	4	0.34	0.28	0.26	6.9	5.8	8.2	25%	25%	25%
	SDLT 9 DS B3	2	2	2	0.49	0.31	0.47	7.1	6.4	7.1	25%	25%	25%
	SDLT 9 DS B4	4	8	4	0.34	0.30	0.42	5.3	7.5	4.8	25%	50%	50%
	SDLT 9 DS B5	2	2	2	0.51	0.35	0.44	6.5	6.9	4.8	25%	25%	25%
Sheardown Tributary 12	SDLT 12 DS B1	3	4	4	0.12	0.10	0.14	7.6	9.5	8.6	50%	50%	50%
	SDLT 12 DS B2	1	2	4	0.27	0.08	0.11	6.0	5.9	7.2	75%	50%	75%
	SDLT 12 DS B3	2	3	3	0.11	0.22	0.17	8.1	9.2	7.6	50%	50%	50%

[a] Substrate measurements taken from the intermediate axis of each individual particle observed within the Surber sampler area as viewed from the surface prior to sampling. Sample size ranged from 7 - 16 measurements per replicate grab, with a mean of 12 for the entire 2016 stream sampling program.

Table F.21: Replicate station habitat feature summary statistics for the Sheardown Lake Tributary benthic stations, Mary River Project CREMP, August 2016. Five stations were sampled at SDLT1 and SDLT9, and three stations were sampled at SDLT9.

Metric	Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Water Depth (cm)	Unnamed Reference Creek	12.5	2.3	1.0	9.7	15.4	10.7	15.3
	Sheardown Tributary 1 (SDLT1)	10.1	0.9	0.4	9.1	11.2	9.3	11.3
	Sheardown Tributary 12 (SDLT12)	2.9	0.7	0.4	1.2	4.6	2.3	3.7
	Sheardown Tributary 9 (SDLT9)	3.1	1.5	0.7	1.2	5.0	2.0	5.3
Water Velocity (cm/s)	Unnamed Reference Creek	29.8	3.6	1.6	25.4	34.2	24.0	33.3
	Sheardown Tributary 1 (SDLT1)	39.7	9.6	4.3	27.8	51.5	29.3	50.7
	Sheardown Tributary 12 (SDLT12)	14.7	2.4	1.4	8.7	20.6	12.0	16.7
	Sheardown Tributary 9 (SDLT9)	34.3	9.2	4.1	22.9	45.8	21.3	43.3
Substrate Size (cm diameter)	Unnamed Reference Creek	7.0	0.7	0.3	6.1	7.8	5.9	7.5
	Sheardown Tributary 1 (SDLT1)	7.5	0.4	0.2	7.0	8.0	7.2	8.1
	Sheardown Tributary 12 (SDLT12)	7.7	1.2	0.7	4.8	10.7	6.4	8.6
	Sheardown Tributary 9 (SDLT9)	6.6	0.6	0.3	5.9	7.3	5.9	7.1
Substrate Embeddedness (%)	Unnamed Reference Creek	25	0	0	25	25	25	25
	Sheardown Tributary 1 (SDLT1)	50	18	8	28	72	25	75
	Sheardown Tributary 12 (SDLT12)	56	10	6	32	79	50	67
	Sheardown Tributary 9 (SDLT9)	33	12	5	19	48	25	50

Table F.22: Benthic station habitat feature statistical comparisons between individual Sheardown Lake Tributaries and Unnamed Reference Creek, Mary River Project CREMP, August 2016. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Pair-wise comparisons[a]				
	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Statistical Test[b]
Water Depth (cm)	Unnamed Reference Creek	SDLT1	YES	0.0591	α , ε
	Unnamed Reference Creek	SDLT12	YES	0.0004	α , ε
	Unnamed Reference Creek	SDLT9	YES	0.0001	α , ζ
Water Velocity (cm/s)	Unnamed Reference Creek	SDLT1	YES	0.0627	α , ε
	Unnamed Reference Creek	SDLT12	YES	0.0007	α
	Unnamed Reference Creek	SDLT9	NO	0.3352	α
Substrate Size (cm diameter)	Unnamed Reference Creek	SDLT1	NO	0.1635	α , ζ
	Unnamed Reference Creek	SDLT12	NO	0.2748	α
	Unnamed Reference Creek	SDLT9	NO	0.3736	α
Substrate Embeddedness (%)	Unnamed Reference Creek	SDLT1	YES	0.0133	α , ζ
	Unnamed Reference Creek	SDLT12	YES	0.0003	α , ζ
	Unnamed Reference Creek	SDLT9	NO	0.1525	α , ζ

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Mann-Whitney U-test; η - data log transformed, single factor ANOVA test conducted; ε - single factor ANOVA test validated using t-test assuming unequal variance

Table F.23: Benthic invertebrate community data for Sheardown Lake Tributaries, August 2016. Densities expressed in number of organisms per square meter.

Station	Unnamed Reference Creek					Sheardown Lake Tributary 1 (SDLT1) - Lower Reach				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
ROUNDWORMS										
P. Nemata	29	29	29	22	18	129	65	86	43	93
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Enchytraeidae	57	29	50	43	22	0	244	660	273	409
F. Lumbriculidae										
Lumbriculus	0	0	0	0	0	0	0	0	0	0
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Trombidiformes										
F. Lebertiidae										
Lebertia	0	0	0	0	0	0	0	0	0	0
F. Sperchonidae										
Sperchon	258	144	179	187	122	115	93	144	144	115
SEED SHRIMPS										
Cl. Ostracoda	57	29	36	22	29	0	7	14	0	0
SPRINGTAILS										
Cl. Entognatha										
O. Collembola	0	0	0	0	0	0	0	0	0	0
INSECTS										
Cl. Insecta										
BEETLES										
O. Coleoptera										
F. Staphylinidae	0	0	0	0	0	0	0	0	0	0
MAYFLIES										
O. Ephemeroptera										
F. Baetidae										
Acentrella feropagus	0	7	14	0	0	0	0	0	0	0
CADDISFLIES										
O. Trichoptera										
F. Limnephilidae										
immature	0	0	0	0	0	0	0	0	0	0
TRUE FLIES										
O. Diptera										
indeterminate	0	0	0	0	0	0	0	0	0	0
MIDGES										
F. Chironomidae										
chironomid pupae	**201**	**108**	**72**	**129**	**75**	0	**14**	**29**	**22**	**7**
S.F. Chironominae										
Micropsectra	0	0	11	14	0	183	0	0	0	7
Paratanytarsus	0	0	0	0	0	90	36	0	39	43
Rheotanytarsus	43	29	0	14	14	151	43	215	161	29
Tanytarsus	0	7	0	29	0	0	0	0	0	0
S.F. Diamesinae										
Diamesa	0	0	0	0	4	0	0	0	0	0
Pseudokiefferiella	57	237	140	61	29	29	57	402	244	237
S.F. Orthocladiinae										
Chaetocladius	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	11	0	0	0	0	0	0	0
Cricotopus	388	258	276	244	83	1216	179	632	499	344
Cricotopus/Orthocladius	0	72	115	90	18	215	22	43	14	22
Diplocladius	14	0	0	0	0	0	0	0	0	0
Doncricotopus	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	0	0	14	0	11	0	0	0	14	0
Hydrobaenus	14	0	0	14	0	0	0	0	0	0
Hydrosmittia	29	14	0	0	0	1033	588	689	703	380
Krenosmittia	0	0	0	0	4	0	0	0	0	0
Limnophyes	0	29	0	14	4	0	0	0	14	0

Table F.23: Benthic invertebrate community data for Sheardown Lake Tributaries, August 2016. Densities expressed in number of organisms per square meter.

Station	Unnamed Reference Creek					Sheardown Lake Tributary 1 (SDLT1) - Lower Reach				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
Metriocnemus	0	0	0	0	0	0	0	43	0	0
Orthocladius (Euorthocladius)	0	0	0	0	0	0	0	0	14	0
Parakiefferiella	0	7	11	0	0	183	36	57	25	7
Paraphaenocladius	14	0	25	47	4	0	7	0	0	7
Thienemanniella	0	0	0	0	0	0	0	0	0	0
Tokunagaia	660	179	581	954	90	0	22	0	0	36
Tvetenia	57	86	115	75	39	0	7	0	0	14
indeterminate	**14**	**14**	0	0	0	0	0	**14**	0	0
S.F. Podonominae										
Trichotanypus	0	0	0	0	0	0	0	0	0	0
S.F. Tanypodinae										
Procladius	0	0	0	0	0	0	0	0	0	0
Thienemannimyia complex	0	7	7	14	4	0	14	29	22	22
F. Empididae										
Clinocera	201	93	79	43	39	0	7	0	7	7
pupae	0	0	0	0	0	0	0	14	0	0
F. Muscidae	4	0	0	0	0	0	0	0	0	0
F. Simuliidae										
Gymnopais	0	0	7	0	4	0	0	0	0	0
Prosimulium	14	14	0	7	0	0	0	0	0	0
Simulium baffinense	0	0	0	0	0	0	0	0	0	0
F. Tipulidae										
Dicranota	0	0	0	0	0	0	0	0	0	0
Ormosia	0	0	0	0	0	0	0	0	0	0
Tipula	68	25	97	65	57	32	68	129	54	108
Number of Organisms (No. organisms per m^2)	2,179	1,417	1,869	2,088	670	3,376	1,509	3,200	2,292	1,887
Richness (total number of taxa)[a]	17	19	19	19	19	11	17	15	16	17
Simpson's Evenness (E)	0.853	0.924	0.885	0.764	0.940	0.837	0.842	0.904	0.873	0.904
Bray-Curtis Index	0.207	0.276	0.092	0.173	0.437	0.761	0.636	0.694	0.652	0.588
Percent Composition										
% Nemata	1.3%	2.0%	1.6%	1.1%	2.7%	3.8%	4.3%	2.7%	1.9%	4.9%
% Oligochaeta	2.6%	2.0%	2.7%	2.1%	3.3%	0.0%	16.2%	20.6%	11.9%	21.7%
% Hydracarina	11.8%	10.2%	9.6%	9.0%	18.2%	3.4%	6.2%	4.5%	6.3%	6.1%
% Ostracods	2.6%	2.0%	1.9%	1.1%	4.3%	0.0%	0.5%	0.4%	0.0%	0.0%
% Chironomids	68.4%	73.9%	73.7%	81.4%	56.6%	91.8%	67.9%	67.3%	77.3%	61.2%
% Metal Sensitive Chironmids	4.6%	19.3%	8.1%	5.7%	7.0%	13.4%	9.0%	19.3%	19.4%	16.7%
% Tipulidae	3.1%	1.8%	5.2%	3.1%	8.5%	0.9%	4.5%	4.0%	2.4%	5.7%
Functional Feeding Group Composition										
% Shredders	24.0%	28.2%	27.2%	20.4%	27.3%	43.3%	18.0%	25.4%	25.0%	25.2%
% Collector - Gatherers	51.9%	50.7%	57.6%	64.6%	44.6%	40.7%	69.1%	61.9%	58.6%	63.0%
% Filterers	2.9%	3.8%	1.0%	3.3%	3.3%	12.6%	5.4%	6.8%	8.9%	4.2%
Habitat Preference Group Composition										
% Clingers	44.8%	47.0%	36.2%	30.9%	46.1%	50.3%	23.1%	33.2%	36.3%	27.5%
% Sprawlers	48.1%	47.1%	54.4%	62.9%	39.4%	45.0%	52.0%	38.2%	47.5%	40.2%
% Burrowers	7.1%	5.9%	9.4%	6.2%	14.5%	4.8%	25.0%	28.7%	16.1%	32.3%

[a] Bold entries excluded from taxa count

Table F.23: Benthic invertebrate community data for Sheardown Lake Tributaries, August 2016. Densities expressed in number of organisms per square meter.

Station	Sheardown Lake Tributary 12 (SDLT12)			Sheardown Lake Tributary 9 (SDLT9)				
Replicate	B1	B2	B3	B1	B2	B3	B4	B5
ROUNDWORMS								
P. Nemata	57	54	65	108	1,249	151	201	115
ANNELIDS								
P. Annelida								
WORMS								
Cl. Oligochaeta								
F. Enchytraeidae	226	222	287	65	43	29	7	29
F. Lumbriculidae								
Lumbriculus	4	0	0	0	0	0	0	0
ARTHROPODS								
P. Arthropoda								
MITES								
Cl. Arachnida								
O. Trombidiformes								
F. Lebertiidae								
Lebertia	0	0	0	7	0	0	0	0
F. Sperchonidae								
Sperchon	4	0	7	29	201	237	115	14
SEED SHRIMPS								
Cl. Ostracoda	4	4	0	151	57	50	136	43
SPRINGTAILS								
Cl. Entognatha								
O. Collembola	0	4	0	36	14	0	29	0
INSECTS								
Cl. Insecta								
BEETLES								
O. Coleoptera								
F. Staphylinidae	0	0	0	7	0	0	0	0
MAYFLIES								
O. Ephemeroptera								
F. Baetidae								
Acentrella feropagus	0	0	0	0	14	57	0	0
CADDISFLIES								
O. Trichoptera								
F. Limnephilidae								
immature	0	0	0	7	0	0	0	0
TRUE FLIES								
O. Diptera								
indeterminate	**14**	0	0	0	0	0	0	0
MIDGES								
F. Chironomidae								
chironomid pupae	**7**	**4**	**36**	**7**	**14**	**29**	**36**	**14**
S.F. Chironominae								
Micropsectra	0	0	7	0	0	0	0	0
Paratanytarsus	11	14	22	0	0	0	0	0
Rheotanytarsus	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	14	0
S.F. Diamesinae								
Diamesa	0	4	14	0	0	14	36	0
Pseudokiefferiella	0	0	0	0	14	0	0	0
S.F. Orthocladiinae								
Chaetocladius	18	39	43	0	14	18	7	0
Corynoneura	0	0	7	0	29	0	0	0
Cricotopus	11	7	0	933	574	1245	266	373
Cricotopus/Orthocladius	7	29	65	287	373	104	0	43
Diplocladius	61	72	158	122	29	0	0	14
Doncricotopus	0	0	0	11	0	0	0	0
Eukiefferiella	0	0	0	0	0	14	0	0
Hydrobaenus	0	4	14	0	0	14	0	0
Hydrosmittia	14	0	14	0	29	118	144	29
Krenosmittia	0	11	14	0	115	147	136	287
Limnophyes	36	57	115	0	57	0	0	14

Table F.23: Benthic invertebrate community data for Sheardown Lake Tributaries, August 2016. Densities expressed in number of organisms per square meter.

Station	Sheardown Lake Tributary 12 (SDLT12)			Sheardown Lake Tributary 9 (SDLT9)				
Replicate	B1	B2	B3	B1	B2	B3	B4	B5
Metriocnemus	7	22	72	47	0	0	22	72
Orthocladius (Euorthocladius)	0	0	0	0	0	0	0	14
Parakiefferiella	0	0	0	0	0	0	0	0
Paraphaenocladius	18	4	0	0	0	0	0	0
Thienemanniella	0	0	0	36	0	14	14	0
Tokunagaia	11	18	93	0	359	43	0	43
Tvetenia	0	0	0	25	29	0	7	0
indeterminate	**4**	**72**	**395**	**179**	**545**	**104**	**380**	**57**
S.F. Podonominae								
Trichotanypus	0	0	0	25	0	14	0	0
S.F. Tanypodinae								
Procladius	0	4	0	0	0	0	0	0
Thienemannimyia complex	0	0	0	29	14	0	0	0
F. Empididae								
Clinocera	0	0	0	0	0	7	0	0
pupae	4	0	0	29	0	0	7	0
F. Muscidae	0	0	0	0	0	0	0	0
F. Simuliidae								
Gymnopais	0	0	0	0	0	7	0	0
Prosimulium	0	0	0	14	0	0	0	0
Simulium baffinense	0	0	0	7	14	0	0	0
F. Tipulidae								
Dicranota	0	0	0	0	0	0	0	29
Ormosia	4	4	0	0	0	0	0	0
Tipula	36	4	43	93	215	341	154	90
Number of Organisms (No. organisms per m	558	653	1,471	2,254	4,002	2,757	1,711	1,280
Richness (total number of taxa)[a]	19	19	17	21	20	19	16	15
Simpson's Evenness (E)	0.842	0.877	0.933	0.783	0.870	0.769	0.915	0.879
Bray-Curtis Index	0.843	0.859	0.761	0.670	0.549	0.655	0.666	0.615
Percent Composition								
% Nemata	10.2%	8.3%	4.4%	4.8%	31.2%	5.5%	11.7%	9.0%
% Oligochaeta	41.2%	34.0%	19.5%	2.9%	1.1%	1.1%	0.4%	2.3%
% Hydracarina	0.7%	0.0%	0.5%	1.6%	5.0%	8.6%	6.7%	1.1%
% Ostracods	0.7%	0.6%	0.0%	6.7%	1.4%	1.8%	7.9%	3.4%
% Chironomids	36.7%	55.3%	72.7%	75.5%	54.8%	68.1%	62.1%	75.0%
% Metal Sensitive Chironmids	2.0%	2.8%	2.9%	0.0%	0.3%	0.5%	2.9%	0.0%
% Tipulidae	7.2%	1.2%	2.9%	4.1%	5.4%	12.4%	9.0%	9.3%
Functional Feeding Group Composition								
% Shredders	9.7%	7.7%	10.5%	65.5%	37.3%	65.1%	35.4%	42.2%
% Collector - Gatherers	84.4%	89.6%	86.9%	29.1%	57.0%	25.8%	56.6%	54.5%
% Filterers	2.0%	2.1%	2.0%	0.9%	0.3%	0.3%	0.9%	0.0%
Habitat Preference Group Composition								
% Clingers	4.7%	7.0%	8.1%	65.5%	37.3%	61.8%	34.4%	36.3%
% Sprawlers	33.0%	44.6%	56.6%	17.7%	24.7%	18.8%	40.6%	39.5%
% Burrowers	62.4%	47.8%	35.4%	15.3%	37.7%	19.4%	23.3%	24.3%

[a] Bold entries excluded from taxa count

Table F.24: Benthic invertebrate community summary statistics for Sheardown Lake Tributaries, Mary River Project CREMP, August 2016. Sample size equals five for SDLT1 and SDLT9, and three for SDLT12.

Metric	Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Density (no. organisms / m^2)	Unnamed Reference Creek	1,645	619	277	876	2,414	670	2,179
	Sheardown Tributary 1 (SDLT1)	2,453	814	364	1,443	3,463	1,509	3,376
	Sheardown Tributary 12 (SDLT12)	894	502	290	-353	2,141	558	1,471
	Sheardown Tributary 9 (SDLT9)	2,401	1,054	471	1,092	3,710	1,280	4,002
Richness (Number of Taxa)	Unnamed Reference Creek	18.6	0.9	0.4	17.5	19.7	17.0	19.0
	Sheardown Tributary 1 (SDLT1)	15.2	2.5	1.1	12.1	18.3	11.0	17.0
	Sheardown Tributary 12 (SDLT12)	18.3	1.2	0.7	15.5	21.2	17.0	19.0
	Sheardown Tributary 9 (SDLT9)	18.2	2.6	1.2	15.0	21.4	15.0	21.0
Simpson's Evenness	Unnamed Reference Creek	0.873	0.070	0.031	0.786	0.960	0.764	0.940
	Sheardown Tributary 1 (SDLT1)	0.872	0.032	0.014	0.832	0.912	0.837	0.904
	Sheardown Tributary 12 (SDLT12)	0.884	0.046	0.027	0.769	0.998	0.842	0.933
	Sheardown Tributary 9 (SDLT9)	0.843	0.063	0.028	0.764	0.922	0.769	0.915
Bray-Curtis Index	Unnamed Reference Creek	0.237	0.130	0.058	0.076	0.398	0.092	0.437
	Sheardown Tributary 1 (SDLT1)	0.666	0.065	0.029	0.585	0.747	0.588	0.761
	Sheardown Tributary 12 (SDLT12)	0.821	0.053	0.030	0.690	0.952	0.761	0.859
	Sheardown Tributary 9 (SDLT9)	0.631	0.051	0.023	0.568	0.694	0.549	0.670
Oligochaeta (% of community)	Unnamed Reference Creek	2.5%	0.5%	0.2%	1.9%	3.2%	2.0%	3.3%
	Sheardown Tributary 1 (SDLT1)	14.1%	8.8%	3.9%	3.2%	25.0%	0.0%	21.7%
	Sheardown Tributary 12 (SDLT12)	31.6%	11.1%	6.4%	4.1%	59.0%	19.5%	41.2%
	Sheardown Tributary 9 (SDLT9)	1.5%	1.0%	0.5%	0.3%	2.8%	0.4%	2.9%
Hydracarina (% of community)	Unnamed Reference Creek	11.7%	3.8%	1.7%	7.1%	16.4%	9.0%	18.2%
	Sheardown Tributary 1 (SDLT1)	5.3%	1.3%	0.6%	3.7%	6.9%	3.4%	6.3%
	Sheardown Tributary 12 (SDLT12)	0.4%	0.4%	0.2%	-0.5%	1.3%	0.0%	0.7%
	Sheardown Tributary 9 (SDLT9)	4.6%	3.2%	1.4%	0.6%	8.6%	1.1%	8.6%
Chironomidae (% of community)	Unnamed Reference Creek	70.8%	9.2%	4.1%	59.4%	82.2%	56.6%	81.4%
	Sheardown Tributary 1 (SDLT1)	73.1%	11.9%	5.3%	58.3%	87.9%	61.2%	91.8%
	Sheardown Tributary 12 (SDLT12)	54.9%	18.0%	10.4%	10.3%	99.5%	36.7%	72.7%
	Sheardown Tributary 9 (SDLT9)	67.1%	8.8%	3.9%	56.2%	78.0%	54.8%	75.5%
Metal-Sensitive Chironomidae (% of community)	Unnamed Reference Creek	8.9%	5.9%	2.7%	1.6%	16.3%	4.6%	19.3%
	Sheardown Tributary 1 (SDLT1)	15.6%	4.4%	2.0%	10.1%	21.0%	9.0%	19.4%
	Sheardown Tributary 12 (SDLT12)	2.6%	0.5%	0.3%	1.3%	3.8%	2.0%	2.9%
	Sheardown Tributary 9 (SDLT9)	0.8%	1.2%	0.6%	-0.8%	2.3%	0.0%	2.9%
Tipulidae (% of community)	Unnamed Reference Creek	4.3%	2.6%	1.2%	1.1%	7.6%	1.8%	8.5%
	Sheardown Tributary 1 (SDLT1)	3.5%	1.9%	0.8%	1.2%	5.8%	0.9%	5.7%
	Sheardown Tributary 12 (SDLT12)	3.8%	3.1%	1.8%	-3.8%	11.4%	1.2%	7.2%
	Sheardown Tributary 9 (SDLT9)	8.0%	3.3%	1.5%	3.9%	12.1%	4.1%	12.4%
Shredder FFG (% of community)	Unnamed Reference Creek	25.4%	3.2%	1.5%	21.4%	29.5%	20.4%	28.2%
	Sheardown Tributary 1 (SDLT1)	27.4%	9.4%	4.2%	15.7%	39.1%	18.0%	43.3%
	Sheardown Tributary 12 (SDLT12)	9.3%	1.5%	0.9%	5.6%	13.0%	7.7%	10.5%
	Sheardown Tributary 9 (SDLT9)	49.1%	15.0%	6.7%	30.4%	67.7%	35.4%	65.5%
Collector-Gatherer FFG (% of community)	Unnamed Reference Creek	53.9%	7.5%	3.4%	44.5%	63.2%	44.6%	64.6%
	Sheardown Tributary 1 (SDLT1)	58.6%	10.7%	4.8%	45.3%	72.0%	40.7%	69.1%
	Sheardown Tributary 12 (SDLT12)	87.0%	2.6%	1.5%	80.5%	93.4%	84.4%	89.6%
	Sheardown Tributary 9 (SDLT9)	44.6%	15.7%	7.0%	25.1%	64.1%	25.8%	57.0%
Filterer FFG (% of community)	Unnamed Reference Creek	2.9%	1.1%	0.5%	1.5%	4.2%	1.0%	3.8%
	Sheardown Tributary 1 (SDLT1)	7.6%	3.3%	1.5%	3.5%	11.6%	4.2%	12.6%
	Sheardown Tributary 12 (SDLT12)	2.1%	0.1%	0.1%	1.8%	2.3%	2.0%	2.1%
	Sheardown Tributary 9 (SDLT9)	0.5%	0.4%	0.2%	0.0%	1.0%	0.0%	0.9%
Clinger HPG (% of community)	Unnamed Reference Creek	41.0%	7.1%	3.2%	32.2%	49.8%	30.9%	47.0%
	Sheardown Tributary 1 (SDLT1)	34.1%	10.4%	4.7%	21.2%	47.0%	23.1%	50.3%
	Sheardown Tributary 12 (SDLT12)	6.6%	1.8%	1.0%	2.2%	11.0%	4.7%	8.1%
	Sheardown Tributary 9 (SDLT9)	47.0%	15.3%	6.8%	28.1%	66.0%	34.4%	65.5%
Sprawler HPG (% of community)	Unnamed Reference Creek	50.4%	8.8%	3.9%	39.5%	61.3%	39.4%	62.9%
	Sheardown Tributary 1 (SDLT1)	44.6%	5.6%	2.5%	37.6%	51.5%	38.2%	52.0%
	Sheardown Tributary 12 (SDLT12)	44.7%	11.8%	6.8%	15.4%	74.0%	33.0%	56.6%
	Sheardown Tributary 9 (SDLT9)	28.2%	11.1%	5.0%	14.5%	42.0%	17.7%	40.6%
Burrower HPG (% of community)	Unnamed Reference Creek	8.6%	3.6%	1.6%	4.2%	13.0%	5.9%	14.5%
	Sheardown Tributary 1 (SDLT1)	21.4%	11.1%	4.9%	7.6%	35.1%	4.8%	32.3%
	Sheardown Tributary 12 (SDLT12)	48.5%	13.5%	7.8%	14.9%	82.1%	35.4%	62.4%
	Sheardown Tributary 9 (SDLT9)	24.0%	8.4%	3.8%	13.5%	34.5%	15.3%	37.7%

Table F.25: Benthic invertebrate community statistical comparisons between individual Sheardown Lake Tributaries and Unnamed Reference Creek, Mary River Project CREMP, August 2016. Shading indicates a signficant difference for respective comparison (p-value≤ 0.1).

Metric	Pair-wise comparisons[a]				
	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Statistical Test[b]
Density	Unnamed Reference Creek	SDLT1	NO	0.1151	α
	Unnamed Reference Creek	SDLT12	NO	0.1283	α
	Unnamed Reference Creek	SDLT9	NO	0.2040	α
Richness	Unnamed Reference Creek	SDLT1	YES	0.0207	α , ζ
	Unnamed Reference Creek	SDLT12	NO	0.7246	α , ζ
	Unnamed Reference Creek	SDLT9	NO	0.7524	α , ζ
Simpson's Evenness	Unnamed Reference Creek	SDLT1	NO	0.9779	α
	Unnamed Reference Creek	SDLT12	NO	0.8247	α
	Unnamed Reference Creek	SDLT9	NO	0.4996	α
Bray-Curtis Index	Unnamed Reference Creek	SDLT1	YES	0.0002	α
	Unnamed Reference Creek	SDLT12	YES	0.0003	α
	Unnamed Reference Creek	SDLT9	YES	0.0002	α
Oligochaeta (% of Community)	Unnamed Reference Creek	SDLT1	NO	0.6760	η , ζ
	Unnamed Reference Creek	SDLT12	YES	0.0000	η
	Unnamed Reference Creek	SDLT9	YES	0.0832	η
Hydracarina (% of Community)	Unnamed Reference Creek	SDLT1	YES	0.0022	η
	Unnamed Reference Creek	SDLT12	YES	0.0006	η , ε
	Unnamed Reference Creek	SDLT9	YES	0.0221	η , ε
Chironomidae (% of Community)	Unnamed Reference Creek	SDLT1	NO	0.6377	η
	Unnamed Reference Creek	SDLT12	NO	0.1427	η
	Unnamed Reference Creek	SDLT9	NO	0.5092	η
Metal Sensitive Taxa (% of Community)	Unnamed Reference Creek	SDLT1	YES	0.0534	η
	Unnamed Reference Creek	SDLT12	YES	0.0208	η
	Unnamed Reference Creek	SDLT9	YES	0.0045	η , ε
Tipulidae (% of Community)	Unnamed Reference Creek	SDLT1	NO	0.5799	η
	Unnamed Reference Creek	SDLT12	NO	0.6763	η
	Unnamed Reference Creek	SDLT9	YES	0.0755	η
Shredder FFG (% of Community)	Unnamed Reference Creek	SDLT1	NO	0.7471	η
	Unnamed Reference Creek	SDLT12	YES	0.0001	η
	Unnamed Reference Creek	SDLT9	YES	0.0066	η , ε
Collector-Gatherer FFG (% of Community)	Unnamed Reference Creek	SDLT1	NO	0.4331	η
	Unnamed Reference Creek	SDLT12	YES	0.0001	η
	Unnamed Reference Creek	SDLT9	NO	0.2569	η , ζ
Filterer FFG (% of Community)	Unnamed Reference Creek	SDLT1	YES	0.0123	η
	Unnamed Reference Creek	SDLT12	NO	0.4943	η
	Unnamed Reference Creek	SDLT9	YES	0.0094	η

Table F.25: Benthic invertebrate community statistical comparisons between individual Sheardown Lake Tributaries and Unnamed Reference Creek, Mary River Project CREMP, August 2016. Shading indicates a signficant difference for respective comparison (p-value≤ 0.1).

Metric	Pair-wise comparisons[a]				
	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Statistical Test[b]
Clinger HPG (% of Community)	Unnamed Reference Creek	SDLT1	NO	0.2368	η
	Unnamed Reference Creek	SDLT12	YES	0.0000	η
	Unnamed Reference Creek	SDLT9	NO	0.4487	η , ε
Sprawler HPG (% of Community)	Unnamed Reference Creek	SDLT1	NO	0.2433	η
	Unnamed Reference Creek	SDLT12	NO	0.4549	η
	Unnamed Reference Creek	SDLT9	YES	0.0094	η
Burrower HPG (% of Community)	Unnamed Reference Creek	SDLT1	YES	0.0691	η , ζ
	Unnamed Reference Creek	SDLT12	YES	0.0004	η , ζ
	Unnamed Reference Creek	SDLT9	YES	0.0020	η , ζ

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Mann-Whitney U-test; η - data log transformed, single factor ANOVA test conducted; ε - single factor ANOVA test validated using t-test assuming unequal variance

Table F.26: Statistical comparison of benthic metrics at Sheardown Lake Tributary 1 (SDLT1) among years of mine operation (2015, 2016) and baseline (2008, 2013) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	YES	0.0004	α , γ	2008	2013	NO	0.3187	Tamhane's
				2008	2015	NO	0.5462	
				2008	2016	YES	0.0235	
				2013	2015	NO	0.9999	
				2013	2016	YES	0.0374	
				2015	2016	YES	0.0320	
Richness	NO	0.3303	α , ε	2008	2013	NO	0.2991	Tukey's HSD
				2008	2015	NO	0.4639	
				2008	2016	NO	0.5128	
				2013	2015	NO	0.9417	
				2013	2016	NO	0.9136	
				2015	2016	NO	0.9996	
Simpson's Evenness	NO	0.8960	α , ε	2008	2013	NO	0.9984	Tukey's HSD
				2008	2015	NO	0.9100	
				2008	2016	NO	0.9372	
				2013	2015	NO	0.9623	
				2013	2016	NO	0.9780	
				2015	2016	NO	0.9997	
Oligochaeta (% of community)	NO	0.7778	β , γ	2008	2013	NO	0.9258	Tukey's HSD
				2008	2015	NO	0.7512	
				2008	2016	NO	0.9747	
				2013	2015	NO	0.9885	
				2013	2016	NO	0.9927	
				2015	2016	NO	0.9038	
Hydracarina (% of community)	YES	0.0224	β , ε	2008	2013	YES	0.0298	Tukey's HSD
				2008	2015	YES	0.0295	
				2008	2016	YES	0.0645	
				2013	2015	NO	0.9805	
				2013	2016	NO	0.8391	
				2015	2016	NO	0.9525	
Chironomidae (% of community)	NO	0.5300	β , ε	2008	2013	NO	0.4923	Tukey's HSD
				2008	2015	NO	0.9698	
				2008	2016	NO	0.8863	
				2013	2015	NO	0.6480	
				2013	2016	NO	0.8033	
				2015	2016	NO	0.9877	
Metal Sensitive Taxa (% of community)	YES	0.0063	β , ε	2008	2013	NO	0.9620	Tamhane's
				2008	2015	YES	0.0028	
				2008	2016	NO	0.1068	
				2013	2015	NO	0.7463	
				2013	2016	NO	1.0000	
				2015	2016	YES	0.0271	
Tipulidae (% of community)	YES	0.0383	β , γ	2008	2013	NO	0.3722	Tukey's HSD
				2008	2015	YES	0.0243	
				2008	2016	NO	0.1724	
				2013	2015	NO	0.4673	
				2013	2016	NO	0.9861	
				2015	2016	NO	0.5559	
Collector-Gatherer FFG (% of community)	YES	0.0092	β , ε	2008	2013	NO	0.1400	Tukey's HSD
				2008	2015	YES	0.0058	
				2008	2016	YES	0.0339	
				2013	2015	NO	0.4269	
				2013	2016	NO	0.9417	
				2015	2016	NO	0.6548	
Shredder FFG (% of community)	YES	0.0355	β , ε	2008	2013	NO	0.2525	Tukey's HSD
				2008	2015	YES	0.0234	
				2008	2016	NO	0.1030	
				2013	2015	NO	0.6357	
				2013	2016	NO	0.9856	
				2015	2016	NO	0.7544	
Filterer FFG (% of community)	NO	0.1817	β , γ	2008	2013	NO	0.3842	Tukey's HSD
				2008	2015	NO	0.9995	
				2008	2016	NO	0.5614	
				2013	2015	NO	0.2532	
				2013	2016	NO	0.9515	
				2015	2016	NO	0.3820	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed; η - data log transformed; β - data logit transformed; ε - single factor ANOVA test conducted; γ - ANOVA validated using Kruskal-Wallis H-test.

Table F.27: Statistical comparison of benthic metrics at Sheardown Lake Tributary 1 (SDLT12) among years of mine operation (2015, 2016) and baseline (2007) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	NO	0.9180	α	2007	2015	NO	0.9194	Tukey's HSD
				2007	2016	NO	0.9597	
				2015	2016	NO	0.9938	
Richness	YES	0.0006	α , ζ	2007	2015	YES	0.0006	Tukey's HSD
				2007	2016	NO	0.8253	
				2015	2016	YES	0.0024	
Simpson's Evenness	NO	0.3815	α	2007	2015	NO	0.4686	Tamhane's
				2007	2016	NO	0.4775	
				2015	2016	NO	0.9999	
Oligochaeta (% of Community)	YES	0.0000	β	2007	2015	YES	0.0001	Tukey's HSD
				2007	2016	YES	0.0001	
				2015	2016	NO	0.9787	
Hydracarina (% of Community)	YES	0.0000	β	2007	2015	NO	0.1454	Tukey's HSD
				2007	2016	NO	0.6097	
				2015	2016	NO	0.5813	
Chironomidae (% of Community)	YES	0.0148	β	2007	2015	YES	0.0540	Tukey's HSD
				2007	2016	YES	0.0193	
				2015	2016	NO	0.8058	
Metal Sensitive Taxa (% of Community)	NO	0.2440	β	2007	2015	NO	0.7289	Tamhane's
				2007	2016	NO	0.9976	
				2015	2016	NO	0.7472	
Tipulidae (% of Community)	YES	0.0084	β	2007	2015	YES	0.0172	Tukey's HSD
				2007	2016	YES	0.0192	
				2015	2016	NO	0.9973	
Collector-Gatherer FFG (% of Community)	YES	0.0143	β	2007	2015	YES	0.0363	Tukey's HSD
				2007	2016	YES	0.0240	
				2015	2016	NO	0.9648	
Shredder FFG (% of Community)	NO	0.1182	β	2007	2015	NO	0.5212	Tukey's HSD
				2007	2016	NO	0.1038	
				2015	2016	NO	0.5424	
Filterer FFG (% of Commmunity)	YES	0.0233	β	2007	2015	YES	0.0401	Tamhane's
				2007	2016	NO	0.9975	
				2015	2016	YES	0.0453	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted;

Table F.28: Statistical comparison of benthic metrics at Sheardown Lake Tributary 9 (SDLT9) among years of mine operation (2015, 2016) and baseline (2007, 2013) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	YES	0.0682	α , ε	2007	2013	NO	0.8757	Tukey's HSD
				2007	2015	NO	0.1587	
				2007	2016	YES	0.0822	
				2013	2015	NO	0.5010	
				2013	2016	NO	0.3025	
				2015	2016	NO	0.9654	
Richness	NO	0.5174	α , ε	2007	2013	NO	0.6988	Tukey's HSD
				2007	2015	NO	0.7089	
				2007	2016	NO	0.4571	
				2013	2015	NO	0.9988	
				2013	2016	NO	0.9907	
				2015	2016	NO	0.9553	
Simpson's Evenness	NO	0.4607	α , ε	2007	2013	NO	0.8752	Tukey's HSD
				2007	2015	NO	0.9106	
				2007	2016	NO	0.9459	
				2013	2015	NO	0.9978	
				2013	2016	NO	0.5317	
				2015	2016	NO	0.5279	
Oligochaeta (% of community)	YES	0.0159	β , ε	2007	2013	NO	0.4828	Tamhane's
				2007	2015	NO	0.1639	
				2007	2016	NO	0.3243	
				2013	2015	NO	0.9149	
				2013	2016	NO	0.8090	
				2015	2016	NO	0.8369	
Hydracarina (% of community)	NO	0.3253	β , γ	2007	2013	NO	0.3585	Tukey's HSD
				2007	2015	NO	0.9959	
				2007	2016	NO	0.9817	
				2013	2015	NO	0.3681	
				2013	2016	NO	0.4427	
				2015	2016	NO	0.9981	
Chironomidae (% of community)	NO	0.1408	β , ε	2007	2013	NO	0.8856	Tukey's HSD
				2007	2015	NO	0.9856	
				2007	2016	NO	0.3374	
				2013	2015	NO	0.6666	
				2013	2016	NO	0.7788	
				2015	2016	NO	0.1243	
Metal Sensitive Taxa (% of community)	YES	0.0110	β , ε	2007	2013	NO	0.3409	Tamhane's
				2007	2015	NO	0.4627	
				2007	2016	NO	0.2646	
				2013	2015	YES	0.0773	
				2013	2016	NO	0.7011	
				2015	2016	NO	0.1368	
Tipulidae (% of community)	NO	0.1906	β , ε	2007	2013	NO	0.9987	Tukey's HSD
				2007	2015	NO	0.7998	
				2007	2016	NO	0.6864	
				2013	2015	NO	0.8777	
				2013	2016	NO	0.5893	
				2015	2016	NO	0.1429	
Collector-Gatherer FFG (% of community)	NO	0.3397	β , γ	2007	2013	NO	0.9932	Tamhane's
				2007	2015	NO	0.9993	
				2007	2016	NO	0.5819	
				2013	2015	NO	1.0000	
				2013	2016	NO	0.4569	
				2015	2016	NO	0.7067	
Shredder FFG (% of community)	NO	0.1191	β , ε	2007	2013	NO	0.9986	Tukey's HSD
				2007	2015	NO	0.9772	
				2007	2016	NO	0.1823	
				2013	2015	NO	0.9955	
				2013	2016	NO	0.2362	
				2015	2016	NO	0.2204	
Filterer FFG (% of community)	NO	0.4149	β , ε	2007	2013	NO	0.9844	Tukey's HSD
				2007	2015	NO	0.9911	
				2007	2016	NO	0.6271	
				2013	2015	NO	0.9020	
				2013	2016	NO	0.4084	
				2015	2016	NO	0.7112	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed; η - data log transformed; β - data logit transformed; ε - single factor ANOVA test conducted; γ - ANOVA validated using Kruskal-Wallis H-test.

Table F.29: Benthic invertebrate community data for Sheardown Lake, August 2016. Densities expressed in number of organisms per square meter.

Station	Sheardown Lake NW (DLO-01) Littoral Stations 2016					Sheardown Lake SE (DLO-02) Littoral Stations 2016				
Replicate	DD Hab9 0	DLO1-03	DLO1-08	DLO1-09	DLO1-10	DLO2-01	DLO2-03	DLO2-09	DLO2-11	DLO2-13
ROUNDWORMS										
P. Nemata	69	0	17	207	17	0	0	112	69	17
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Lumbriculidae										
Lumbriculus	0	0	0	69	9	0	0	0	0	0
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
immature	0	0	**9**	0	0	0	0	0	0	0
F. Acalyptonotidae										
Acalyptonotus	0	34	52	138	69	26	34	172	34	9
F. Hygrobatidae										
Hygrobates	0	0	69	0	26	9	0	129	0	0
F. Lebertiidae										
Lebertia	0	0	34	0	17	9	0	0	0	9
HARPACTICOIDS										
O. Harpacticoida	0	0	0	69	0	0	0	0	0	0
SEED SHRIMPS										
Cl. Ostracoda	276	966	103	2,000	52	86	0	9	138	9
WATER SCUDS										
O. Amphipoda										
F. Hyalellidae										
Hyalella	0	0	0	0	0	0	0	0	0	0
INSECTS										
Cl. Insecta										
CADDISFLIES										
O. Trichoptera										
F. Apataniidae										
Apatania	34	0	0	0	0	0	0	0	0	0
TRUE FLIES										
O. Diptera										
MIDGES										
F. Chironomidae										
chironomid pupae	**34**	0	0	**69**	**9**	**26**	0	**9**	0	0
S.F. Chironominae										
Chironomus	0	190	0	69	0	1,681	1,069	0	328	0
Micropsectra	793	1,267	78	1,034	43	60	103	155	34	34
Parachironomus	0	0	0	69	0	0	0	0	0	0
Paratanytarsus	586	1,905	0	1,517	9	60	0	0	34	0
Sergentia	0	569	0	69	0	9	34	0	0	0
Stictochironomus	1,690	2,405	86	2,138	517	34	1,000	1,957	707	1,052
Tanytarsus	241	500	0	966	0	319	69	138	164	0
S.F. Diamesinae										
Diamesa	0	0	9	0	78	0	0	0	0	26
Pseudodiamesa	0	0	9	0	17	0	0	0	0	0
S.F. Orthocladiinae										
Abiskomyia	345	379	112	966	103	34	138	509	345	397
Cricotopus/Orthocladius	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	517	129	293	690	78	9	0	52	34	0
Paracladius	0	0	60	0	69	0	0	0	0	0
Parakiefferiella	0	0	0	69	0	0	34	9	0	0
Psectrocladius	0	0	0	69	0	0	0	0	0	0
Zalutschia	34	60	17	0	26	0	0	43	0	0
Genus *"Greenland"*	0	0	0	0	0	0	0	0	0	0

Table F.29: Benthic invertebrate community data for Sheardown Lake, August 2016. Densities expressed in number of organisms per square meter.

Station	Sheardown Lake NW (DLO-01) Littoral Stations 2016					Sheardown Lake SE (DLO-02) Littoral Stations 2016				
Replicate	DD Hab9 0	DLO1-03	DLO1-08	DLO1-09	DLO1-10	DLO2-01	DLO2-03	DLO2-09	DLO2-11	DLO2-13
S.F. Tanypodinae										
Arctopelopia	552	500	0	207	0	17	0	43	34	0
Procladius	34	60	500	69	276	1,241	724	2,888	422	1,552
CRANE FLIES										
F. Tipulidae	0	0	0	0	0	0	0	0	0	0
Dicranota	0	0	0	0	0	0	0	0	0	0
Density (No. organisms per m^2)	5,205	8,964	1,448	10,484	1,415	3,620	3,205	6,225	2,343	3,105
Richness (total number of taxa)[a]	12	13	14	18	16	14	9	13	12	9
Simpson's Evenness (E)	0.901	0.908	0.878	0.918	0.860	0.703	0.829	0.732	0.900	0.696
Bray-Curtis Index	0.711	0.684	0.634	0.688	0.628	0.886	0.789	0.736	0.669	0.724
Percent Composition										
% Nemata	1.3%	0.0%	1.2%	2.0%	1.2%	0.0%	0.0%	1.8%	2.9%	0.5%
% Hydracarina	0.0%	0.4%	11.3%	1.3%	7.9%	1.2%	1.1%	4.8%	1.5%	0.6%
% Ostracods	5.3%	10.8%	7.1%	19.1%	3.7%	2.4%	0.0%	0.1%	5.9%	0.3%
% Chironomids	92.7%	88.8%	80.4%	76.3%	86.6%	96.4%	98.9%	93.2%	89.7%	98.6%
% Metal Sensitive Chironmids	31.4%	41.0%	6.6%	33.8%	10.5%	12.2%	5.4%	4.7%	9.9%	1.9%
Functional Feeding Group Composition										
% Shredders	0.7%	0.7%	1.2%	0.0%	1.8%	0.0%	0.0%	0.7%	0.0%	0.0%
% Collector - Gatherers	56.0%	51.7%	47.6%	61.5%	66.9%	51.5%	71.0%	42.6%	69.2%	48.3%
% Filterers	31.4%	41.0%	5.4%	33.8%	3.7%	12.2%	5.4%	4.7%	9.9%	1.1%
Habitat Preference Group Composition										
% Clingers	20.7%	26.4%	16.7%	21.2%	11.0%	12.0%	7.5%	9.6%	9.9%	1.7%
% Sprawlers	45.2%	44.6%	75.6%	54.9%	44.7%	40.0%	28.0%	57.1%	43.0%	63.1%
% Burrowers	34.0%	28.9%	7.7%	23.9%	44.2%	47.7%	64.6%	33.3%	47.1%	35.3%

[a] Bold entries excluded from taxa count

Table F.30: Statistical comparison of benthic metrics at Sheardown Lake NW (SDNW) among years of mine operation (2015, 2016) and baseline (2007, 2008, 2013) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 5-group Comparison			Pair-wise, post-hoc comparisons [a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	NO	0.5171	η , γ	2007	2008	NO	0.9979	Tukey's HSD
				2007	2013	NO	0.7838	
				2007	2015	NO	1.0000	
				2007	2016	NO	0.9648	
				2008	2013	NO	0.9082	
				2008	2015	NO	0.9926	
				2008	2016	NO	0.8654	
				2013	2015	NO	0.7033	
				2013	2016	NO	0.4144	
				2015	2016	NO	0.9765	
Richness	NO	0.1992	η , γ	2007	2008	NO	0.1143	Mann-Whitney U-test
				2007	2013	NO	0.1143	
				2007	2015	NO	0.2857	
				2007	2016	NO	0.1905	
				2008	2013	NO	0.4000	
				2008	2015	NO	0.5556	
				2008	2016	NO	0.9048	
				2013	2015	NO	0.1429	
				2013	2016	NO	0.1429	
				2015	2016	NO	0.6905	
Simpson's Evenness	YES	0.0450	α , γ	2007	2008	NO	0.6210	Tukey's HSD
				2007	2013	NO	0.4331	
				2007	2015	NO	0.9997	
				2007	2016	NO	0.1143	
				2008	2013	NO	0.9921	
				2008	2015	NO	0.4635	
				2008	2016	NO	0.7978	
				2013	2015	NO	0.3060	
				2013	2016	NO	0.9775	
				2015	2016	YES	0.0588	
Ostracoda (% of community)	NO	0.3232	ζ	2007	2008	NO	0.9999	Tamhane's
				2007	2013	NO	0.8678	
				2007	2015	NO	1.0000	
				2007	2016	NO	1.0000	
				2008	2013	NO	0.5727	
				2008	2015	NO	1.0000	
				2008	2016	NO	1.0000	
				2013	2015	NO	0.1906	
				2013	2016	NO	0.2679	
				2015	2016	NO	1.0000	
Chironomidae (% of community)	YES	0.0361	β , ε	2007	2008	NO	0.9916	Tukey's HSD
				2007	2013	NO	0.3049	
				2007	2015	NO	0.5319	
				2007	2016	NO	0.9946	
				2008	2013	NO	0.5153	
				2008	2015	NO	0.2929	
				2008	2016	NO	0.9099	
				2013	2015	YES	0.0193	
				2013	2016	NO	0.1494	
				2015	2016	NO	0.7191	

Table F.30: Statistical comparison of benthic metrics at Sheardown Lake NW (SDNW) among years of mine operation (2015, 2016) and baseline (2007, 2008, 2013) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 5-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Metal Sensitive Taxa (% of community)	NO	0.7968	β , ε	2007	2008	NO	1.0000	Tamhane's
				2007	2013	NO	0.9919	
				2007	2015	NO	0.9988	
				2007	2016	NO	0.9946	
				2008	2013	NO	1.0000	
				2008	2015	NO	1.0000	
				2008	2016	NO	1.0000	
				2013	2015	NO	0.9997	
				2013	2016	NO	1.0000	
				2015	2016	NO	1.0000	
Collector-Gatherer FFG (% of community)	NO	0.3162	β , ε	2007	2008	NO	0.6801	Tukey's HSD
				2007	2013	NO	0.8998	
				2007	2015	NO	0.9844	
				2007	2016	NO	0.2820	
				2008	2013	NO	0.9966	
				2008	2015	NO	0.9000	
				2008	2016	NO	0.9609	
				2013	2015	NO	0.9910	
				2013	2016	NO	0.8627	
				2015	2016	NO	0.4946	
Filterer FFG (% of community)	NO	0.8744	β , ε	2007	2008	NO	1.0000	Tamhane's
				2007	2013	NO	0.9899	
				2007	2015	NO	0.9986	
				2007	2016	NO	0.9998	
				2008	2013	NO	0.9998	
				2008	2015	NO	1.0000	
				2008	2016	NO	1.0000	
				2013	2015	NO	0.9988	
				2013	2016	NO	1.0000	
				2015	2016	NO	1.0000	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed; η - data log transformed; β - data logit transformed; ε - single factor ANOVA test conducted; γ - ANOVA validated using Kruskal-Wallis H-test.

Table F.31: Statistical comparison of benthic metrics at Sheardown Lake SE littoral stations among years of mine operation (2015, 2016) and baseline (2013) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Summary Statistics		Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	Year	Mean	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	YES	0.0036	α	2013	10,649	2013	2015	YES	0.0848	Tamhane's
				2015	4,829	2013	2016	YES	0.0455	
				2016	3,700	2015	2016	NO	0.6951	
Richness	NO	0.1829	α	2013	14.2	2013	2015	NO	0.1847	Tukey's HSD
				2015	10.6	2013	2016	NO	0.3399	
				2016	11.4	2015	2016	NO	0.9084	
Simpson's Evenness	NO	0.9249	α	2013	0.785	2013	2015	NO	0.9176	Tukey's HSD
				2015	0.759	2013	2016	NO	0.9767	
				2016	0.772	2015	2016	NO	0.9805	
Nemata (% of Community)	NO	0.8511	β	2013	0.2%	2013	2015	NO	0.9999	Tukey's HSD
				2015	1.5%	2013	2016	NO	0.8784	
				2016	1.1%	2015	2016	NO	0.8717	
Ostracoda (% of Community)	NO	0.8953	β , ζ	2013	5.9%	2013	2015	NO	0.9383	Tukey's HSD
				2015	5.5%	2013	2016	NO	0.8937	
				2016	1.7%	2015	2016	NO	0.9930	
Chironomidae (% of Community)	NO	0.1441	β	2013	89.9%	2013	2015	NO	0.9877	Tukey's HSD
				2015	88.9%	2013	2016	NO	0.2200	
				2016	95.4%	2015	2016	NO	0.1748	
Metal Sensitive Taxa (% of Community)	NO	0.3656	β	2013	15.1%	2013	2015	NO	0.8662	Tukey's HSD
				2015	12.7%	2013	2016	NO	0.3438	
				2016	6.8%	2015	2016	NO	0.6233	
Collector-Gatherer FFG (% of Community)	NO	0.1151	β	2013	44.6%	2013	2015	NO	0.1254	Tukey's HSD
				2015	59.1%	2013	2016	NO	0.2193	
				2016	56.5%	2015	2016	NO	0.9335	
Filterer FFG (% of Commmunity)	NO	0.3224	β	2013	15.1%	2013	2015	NO	0.8751	Tukey's HSD
				2015	12.5%	2013	2016	NO	0.3056	
				2016	6.7%	2015	2016	NO	0.5608	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted;

Table F.32: Replicate grab data for benthic invertebrate community samples collected at the Mary River, Mary River Project CREMP, August 2016.

Study Area	Station	Water Depth (cm)			Water Velocity (m/s)			Substrate Size[a] (cm)			Embeddedness		
		Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3
Mary River Upstream (Reference)	GO-09 B1	6	8	8	0.29	0.39	0.38	7.8	7.5	10.0	25%	25%	25%
	GO-09 B2	10	14	14	0.21	0.38	0.40	7.2	5.1	5.0	25%	25%	25%
	GO-09 B3	8	14	6	0.26	0.27	0.32	6.4	6.7	8.0	50%	25%	25%
	GO-09 B4	8	6	6	0.22	0.23	0.27	7.7	8.3	10.3	50%	50%	50%
	GO-09 B5	18	10	12	0.28	0.31	0.27	7.0	7.5	9.5	25%	25%	25%
Mary River Upstream	GO-03 B1	16	16	16	0.28	0.24	0.32	7.6	10.6	10.9	50%	25%	25%
	GO-03 B2	8	10	12	0.25	0.21	0.22	7.6	10.9	9.4	25%	50%	50%
	GO-03 B3	12	8	12	0.21	0.32	0.34	9.2	10.5	8.3	50%	25%	25%
	GO-03 B4	12	10	14	0.32	0.33	0.26	6.6	7.3	7.9	50%	50%	25%
	GO-03 B5	12	12	14	0.28	0.28	0.37	7.3	8.6	8.6	25%	25%	25%
Mary River	EO-01 B1	12	12	0	0.32	0.35	0.35	6.8	6.6	7.4	25%	25%	25%
	EO-01 B2	12	12	14	0.27	0.31	0.36	9.7	8.3	7.6	25%	25%	50%
	EO-01 B3	12	8	4	0.23	0.23	0.25	8.3	6.9	7.8	50%	50%	25%
	EO-01 B4	16	16	14	0.23	0.21	0.20	9.0	10.1	7.9	50%	50%	50%
	EO-01 B5	12	12	10	0.22	0.26	0.31	7.9	6.6	7.5	50%	50%	50%
Mary River	EO-20 B1	16	16	16	0.41	0.38	0.24	5.2	6.0	5.3	25%	25%	25%
	EO-20 B2	14	12	14	0.21	0.22	0.25	7.8	7.2	7.2	25%	25%	25%
	EO-20 B3	14	10	14	0.31	0.27	0.36	6.6	6.2	7.3	25%	25%	25%
	EO-20 B4	12	10	16	0.22	0.46	0.36	6.7	10.5	6.4	50%	50%	50%
	EO-20 B5	14	10	10	0.28	0.40	0.34	8.2	7.2	9.4	25%	25%	25%
Mary River Downstream	CO-05 B1	16	10	14	0.38	0.35	0.23	9.4	7.8	6.4	50%	50%	25%
	CO-05 B2	8	8	8	0.32	0.32	0.34	5.8	6.9	5.2	50%	50%	50%
	CO-05 B3	10	14	14	0.23	0.33	0.27	8.2	7.2	7.9	50%	50%	50%
	CO-05 B4	14	8	10	0.25	0.29	0.41	6.1	8.2	7.8	50%	50%	50%
	CO-05 B5	10	12	16	0.23	0.27	0.39	11.3	7.3	7.6	50%	50%	50%

[a] Substrate measurements taken from the intermediate axis of each individual particle observed within the Surber sampler area as viewed from the surface prior to sampling. Sample size ranged from 6 - 16 measurements per replicate grab, with a mean of 12 for the entire 2016 stream sampling program.

Table F.33: Replicate station habitat feature summary statistics for Mary River benthic stations, Mary River Project CREMP, August 2016. Five stations were sampled at each study area.

Metric	Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Water Depth (cm)	GO-09 Reference Area	9.9	3.0	1.4	6.1	13.6	6.7	13.3
	GO-03 Upstream Area	12.3	2.3	1.0	9.4	15.2	10.0	16.0
	EO-01 Upper Mine-Exposed Area	11.1	3.1	1.4	7.2	15.0	8.0	15.3
	EO-20 Middle Mine-Exposed Area	13.2	1.7	0.8	11.1	15.3	11.3	16.0
	CO-05 Lower Mine-Exposed Area	11.5	2.2	1.0	8.8	14.2	8.0	13.3
Water Velocity (cm/s)	GO-09 Reference Area	29.9	4.4	2.0	24.4	35.3	24.0	35.3
	GO-03 Upstream Area	28.2	3.3	1.5	24.1	32.3	22.7	31.0
	EO-01 Upper Mine-Exposed Area	27.3	5.3	2.4	20.8	33.9	21.3	34.0
	EO-20 Middle Mine-Exposed Area	31.4	5.1	2.3	25.1	37.7	22.7	34.7
	CO-05 Lower Mine-Exposed Area	30.7	2.0	0.9	28.2	33.3	27.7	32.7
Substrate Size (cm diameter)	GO-09 Reference Area	7.6	1.2	0.5	6.1	9.1	5.8	8.8
	GO-03 Upstream Area	8.7	1.0	0.4	7.5	10.0	7.3	9.7
	EO-01 Upper Mine-Exposed Area	7.9	0.9	0.4	6.8	8.9	6.9	9.0
	EO-20 Middle Mine-Exposed Area	7.1	1.1	0.5	5.8	8.5	5.5	8.3
	CO-05 Lower Mine-Exposed Area	7.5	1.0	0.5	6.3	8.8	6.0	8.7
Substrate Embeddedness (%)	GO-09 Reference Area	32	11	5	18	45	25	50
	GO-03 Upstream Area	35	7	3	26	44	25	42
	EO-01 Upper Mine-Exposed Area	40	11	5	27	53	25	50
	EO-20 Middle Mine-Exposed Area	30	11	5	16	44	25	50
	CO-05 Lower Mine-Exposed Area	48	4	2	44	53	42	50

Table F.34: Benthic station habitat feature statistical comparisons among Mary River reference and mine-exposed study areas, Mary River Project CREMP, August 2016. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Areas?	p-value	Statistical Test [b]	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Statistical Test
Water Depth (cm)	NO	0.3336	α	GO-09	GO-03	NO	0.5785	Tukey's HSD
				GO-09	EO-01	NO	0.9427	
				GO-09	EO-20	NO	0.2696	
				GO-09	CO-05	NO	0.8544	
				GO-03	EO-01	NO	0.9427	
				GO-03	EO-20	NO	0.9765	
				GO-03	CO-05	NO	0.9867	
				EO-01	EO-20	NO	0.6784	
				EO-01	CO-05	NO	0.9991	
				EO-20	CO-05	NO	0.8155	
Water Velocity (cm/s)	NO	0.5353	η , ζ	GO-09	GO-03	NO	0.9773	Tukey's HSD
				GO-09	EO-01	NO	0.8534	
				GO-09	EO-20	NO	0.9869	
				GO-09	CO-05	NO	0.9954	
				GO-03	EO-01	NO	0.9928	
				GO-03	EO-20	NO	0.8196	
				GO-03	CO-05	NO	0.8733	
				EO-01	EO-20	NO	0.5787	
				EO-01	CO-05	NO	0.6504	
				EO-20	CO-05	NO	1.0000	
Substrate Size (cm diameter)	NO	0.1935	α	GO-09	GO-03	NO	0.4285	Tukey's HSD
				GO-09	EO-01	NO	0.9916	
				GO-09	EO-20	NO	0.9545	
				GO-09	CO-05	NO	1.0000	
				GO-03	EO-01	NO	0.6885	
				GO-03	EO-20	NO	0.1435	
				GO-03	CO-05	NO	0.3742	
				EO-01	EO-20	NO	0.7851	
				EO-01	CO-05	NO	0.9818	
				EO-20	CO-05	NO	0.9740	
Substrate Embeddedness (%)	YES	0.0333	β , ζ	GO-09	GO-03	NO	0.9646	Tukey's HSD
				GO-09	EO-01	NO	0.6012	
				GO-09	EO-20	NO	0.9976	
				GO-09	CO-05	YES	0.0658	
				GO-03	EO-01	NO	0.9259	
				GO-03	EO-20	NO	0.8666	
				GO-03	CO-05	NO	0.2176	
				EO-01	EO-20	NO	0.4157	
				EO-01	CO-05	NO	0.6338	
				EO-20	CO-05	YES	0.0343	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data logit transformed, single factor ANOVA test conducted;

Table F.35: Benthic invertebrate community data for Mary River, August 2016. Densities expressed in number of organisms per square meter.

Station	GO-09 Reference Area					GO-03 Upstream of Mine				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
ROUNDWORMS										
P. Nemata	14	7	14	0	14	7	11	7	4	7
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Enchytraeidae	0	0	0	0	0	0	0	4	0	0
F. Naididae										
S.F. Tubificinae										
immatures without hair chaetae	0	0	0	0	0	0	0	0	0	0
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
indeterminate	0	0	0	0	0	0	0	0	0	0
F. Sperchonidae										
Sperchon	11	14	50	47	39	32	14	36	25	22
SEED SHRIMPS										
Cl. Ostracoda	0	0	0	0	0	0	0	0	0	0
INSECTS										
Cl. Insecta										
MAYFLIES										
O. Ephemeroptera										
F. Baetidae										
Acentrella feropagus	0	0	0	0	0	0	0	0	0	0
STONEFLIES										
O. Plecoptera										
F. Capniidae										
immature	0	0	0	0	0	0	4	0	0	0
TRUE FLIES										
O. Diptera										
BITING-MIDGE										
F. Ceratopogonidae										
Culicoides	0	0	0	0	0	0	0	4	0	0
MIDGES										
F. Chironomidae										
chironomid pupae	**14**	**7**	**29**	**11**	**11**	**39**	**4**	**7**	**4**	**11**
S.F. Chironominae										
Micropsectra	0	0	0	0	0	0	0	0	0	0
Paratanytarsus	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0
Stictochironomus	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0	0	0	0
S.F. Diamesinae										
Diamesa	75	47	36	14	90	14	4	4	0	0
Pseudokiefferiella	4	14	47	154	413	47	47	11	4	14
S.F. Orthocladiinae										
Chaetocladius	4	0	0	0	0	0	7	4	0	0
Cardiocladius	0	0	0	14	0	32	0	0	0	36
Corynoneura	0	0	0	0	0	0	0	7	0	0
Cricotopus	18	36	72	86	90	61	50	22	14	4
Cricotopus/Orthocladius	7	0	7	4	0	11	0	0	7	4
Diplocladius	65	4	4	0	0	7	0	0	0	4
Eukiefferiella	0	39	97	32	118	0	0	0	0	0
Hydrobaenus	0	4	7	22	7	0	7	25	0	4
Hydrosmittia	0	0	0	0	7	4	11	0	4	4
Krenosmittia	4	4	11	4	18	4	36	7	7	22
Limnophyes	0	11	11	14	0	0	7	0	7	7
Orthocladius (Euorthocladius)	65	43	65	18	50	11	0	11	14	29
Parakiefferiella	0	0	0	0	0	7	0	0	0	0
Paraphaenocladius	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	4	0	0	0	4	0	0	0	0

Table F.35: Benthic invertebrate community data for Mary River, August 2016. Densities expressed in number of organisms per square meter.

Station	GO-09 Reference Area					GO-03 Upstream of Mine				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
Tokunagaia	129	75	194	133	222	126	72	72	75	43
Tvetenia	0	4	0	0	0	4	7	0	7	0
indeterminate	0	0	0	0	0	**4**	**4**	0	**4**	0
S.F. Tanypodinae										
Thienemannimyia complex	0	0	0	0	0	0	0	0	0	0
F. Empididae										
Clinocera	0	0	0	0	0	0	0	0	0	0
F. Simuliidae										
Gymnopais	22	7	61	83	83	7	0	0	0	0
Metacnephia	0	0	0	0	0	0	0	0	0	4
Prosimulium/Helodon	0	0	0	0	0	0	0	0	0	0
indeterminate	0	0	**4**	**4**	0	0	0	0	0	0
F. Tipulidae										
Dicranota	0	0	0	0	0	0	0	0	0	0
Tipula	11	14	14	7	0	4	39	11	11	50
Number of Organisms (No. organisms per m^2)	443	334	723	647	1,162	425	324	232	187	265
Richness (total number of taxa)[a]	13	16	15	14	12	17	14	14	12	15
Simpson's Evenness (E)	0.893	0.932	0.920	0.914	0.875	0.878	0.931	0.902	0.841	0.942
Bray-Curtis Index	0.351	0.278	0.142	0.228	0.385	0.300	0.473	0.518	0.545	0.613
Percent Composition										
% Nemata	3.2%	2.1%	1.9%	0.0%	1.2%	1.6%	3.4%	3.0%	2.1%	2.6%
% Oligochaeta	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%
% Hydracarina	2.5%	4.2%	6.9%	7.3%	3.4%	7.5%	4.3%	15.5%	13.4%	8.3%
% Ostracods	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% Chironomids	86.9%	87.4%	80.2%	78.2%	88.3%	88.2%	79.0%	73.3%	78.6%	68.7%
% Metal Sensitive Chironmids	17.8%	18.3%	11.5%	26.0%	43.3%	14.4%	15.7%	6.5%	2.1%	5.3%
% Tipulidae	2.5%	4.2%	1.9%	1.1%	0.0%	0.9%	12.0%	4.7%	5.9%	18.9%
Functional Feeding Group Composition										
% Shredders	8.4%	15.3%	13.4%	15.3%	7.8%	20.0%	29.3%	14.7%	17.6%	21.9%
% Collector - Gatherers	84.2%	78.4%	70.7%	61.8%	81.7%	62.6%	66.4%	68.1%	69.0%	54.0%
% Filterers	5.0%	2.1%	9.0%	13.4%	7.1%	1.6%	0.0%	0.0%	0.0%	1.5%
Habitat Preference Group Composition										
% Clingers	13.3%	17.4%	27.4%	34.9%	18.3%	28.2%	21.6%	25.4%	25.1%	12.8%
% Sprawlers	81.0%	76.3%	68.7%	61.8%	80.5%	60.9%	63.0%	63.4%	66.8%	51.3%
% Burrowers	5.6%	6.3%	3.9%	3.2%	1.2%	10.8%	15.4%	11.2%	8.0%	35.8%

[a] Bold entries excluded from taxa count

Table F.35: Benthic invertebrate community data for Mary River, August 2016. Densities expressed in number of organisms per square meter.

Station	EO-01 Upper Mine-Exposed					EO-20 Middle Mine-Exposed				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
ROUNDWORMS										
P. Nemata	4	0	7	7	4	0	4	4	4	7
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Enchytraeidae	4	0	0	25	0	0	0	0	0	4
F. Naididae										
S.F. Tubificinae										
immatures without hair chaetae	0	0	0	0	0	0	0	0	0	0
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
indeterminate	0	0	0	0	0	0	0	**4**	0	0
F. Sperchonidae										
Sperchon	0	14	22	36	18	14	22	11	4	39
SEED SHRIMPS										
Cl. Ostracoda	0	0	0	0	0	0	0	0	0	0
INSECTS										
Cl. Insecta										
MAYFLIES										
O. Ephemeroptera										
F. Baetidae										
Acentrella feropagus	0	0	0	0	0	0	0	0	0	0
STONEFLIES										
O. Plecoptera										
F. Capniidae										
immature	0	0	0	0	0	0	0	0	0	0
TRUE FLIES										
O. Diptera										
BITING-MIDGE										
F. Ceratopogonidae										
Culicoides	0	0	0	14	11	4	7	0	0	0
MIDGES										
F. Chironomidae										
chironomid pupae	**11**	**7**	0	**22**	**14**	**14**	**11**	**18**	**14**	**7**
S.F. Chironominae										
Micropsectra	0	0	0	4	4	0	0	0	0	0
Paratanytarsus	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	4	0	0
Stictochironomus	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0	0	0	0
S.F. Diamesinae										
Diamesa	4	4	0	4	0	11	0	7	0	0
Pseudokiefferiella	7	11	0	7	7	7	7	4	4	14
S.F. Orthocladiinae										
Chaetocladius	0	0	4	7	0	0	4	4	0	11
Cardiocladius	18	0	0	0	4	36	57	14	22	39
Corynoneura	0	0	7	0	0	0	4	0	0	0
Cricotopus	0	4	0	11	22	4	18	4	0	14
Cricotopus/Orthocladius	0	0	4	7	25	0	4	0	4	4
Diplocladius	0	0	7	0	7	0	4	0	0	7
Eukiefferiella	4	0	0	0	0	0	0	0	0	0
Hydrobaenus	0	11	0	11	0	0	0	0	0	4
Hydrosmittia	0	0	0	7	0	0	0	0	0	0
Krenosmittia	4	25	43	22	0	14	18	7	14	14
Limnophyes	0	0	4	4	11	4	7	0	7	11
Orthocladius (Euorthocladius)	14	0	25	0	29	25	25	0	47	39
Parakiefferiella	0	0	0	0	4	0	0	0	0	0
Paraphaenocladius	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0

Table F.35: Benthic invertebrate community data for Mary River, August 2016. Densities expressed in number of organisms per square meter.

Station	EO-01 Upper Mine-Exposed					EO-20 Middle Mine-Exposed				
Replicate	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
Tokunagaia	39	43	75	136	136	79	118	61	93	172
Tvetenia	0	14	7	4	18	11	7	4	0	4
indeterminate	0	0	0	**4**	0	0	**7**	**14**	**4**	**7**
S.F. Tanypodinae										
Thienemannimyia complex	0	0	0	0	0	0	0	0	0	0
F. Empididae										
Clinocera	0	0	4	4	4	0	4	0	0	4
F. Simuliidae										
Gymnopais	0	0	4	0	0	0	0	0	4	0
Metacnephia	0	0	0	0	0	0	0	0	0	0
Prosimulium/Helodon	0	0	0	0	0	0	0	0	0	0
indeterminate	0	0	0	0	0	0	0	0	0	0
F. Tipulidae										
Dicranota	0	0	0	0	0	0	0	0	0	0
Tipula	4	0	11	7	18	4	14	0	7	57
Number of Organisms (No. organisms per m	113	133	224	343	336	227	342	160	228	458
Richness (total number of taxa)[a]	10	8	14	18	16	12	17	11	11	17
Simpson's Evenness (E)	0.871	0.913	0.884	0.820	0.839	0.873	0.862	0.789	0.799	0.852
Bray-Curtis Index	0.736	0.738	0.592	0.493	0.440	0.591	0.477	0.664	0.511	0.431
Percent Composition										
% Nemata	3.5%	0.0%	3.1%	2.0%	1.2%	0.0%	1.2%	2.5%	1.8%	1.5%
% Oligochaeta	3.5%	0.0%	0.0%	7.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%
% Hydracarina	0.0%	10.5%	9.8%	10.5%	5.4%	6.2%	6.4%	9.4%	1.8%	8.5%
% Ostracods	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% Chironomids	89.4%	89.5%	78.6%	72.9%	83.6%	90.3%	85.1%	88.1%	91.7%	75.8%
% Metal Sensitive Chironmids	9.7%	11.3%	0.0%	4.4%	3.3%	7.9%	2.0%	6.9%	1.8%	3.1%
% Tipulidae	3.5%	0.0%	4.9%	2.0%	5.4%	1.8%	4.1%	0.0%	3.1%	12.4%
Functional Feeding Group Composition										
% Shredders	3.5%	3.0%	6.7%	7.6%	19.9%	3.5%	10.8%	6.3%	4.8%	16.6%
% Collector - Gatherers	78.8%	86.5%	79.9%	75.2%	67.9%	71.4%	61.7%	73.1%	81.1%	65.1%
% Filterers	0.0%	0.0%	1.8%	1.5%	1.2%	0.0%	0.0%	0.0%	1.8%	0.0%
Habitat Preference Group Composition										
% Clingers	0.0%	13.5%	15.2%	17.2%	21.1%	7.9%	14.3%	15.6%	5.3%	13.5%
% Sprawlers	71.7%	86.5%	76.8%	67.3%	67.9%	71.4%	60.5%	70.6%	79.4%	62.7%
% Burrowers	28.3%	0.0%	8.0%	15.5%	11.0%	20.7%	25.1%	13.8%	15.4%	23.8%

[a] Bold entries excluded from taxa count

Table F.35: Benthic invertebrate community data for Mary River, August 2016. Densities expressed in number of organisms per square meter.

Station	CO-05 Lower Mine-Exposed				
Replicate	B1	B2	B3	B4	B5
ROUNDWORMS					
P. Nemata	18	7	4	39	22
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	0	7	22	4	18
F. Naididae					
S.F. Tubificinae					
immatures without hair chaetae	0	0	0	0	4
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
indeterminate	0	0	0	0	0
F. Sperchonidae					
Sperchon	32	54	68	104	68
SEED SHRIMPS					
Cl. Ostracoda	4	0	7	4	0
INSECTS					
Cl. Insecta					
MAYFLIES					
O. Ephemeroptera					
F. Baetidae					
Acentrella feropagus	0	0	0	25	0
STONEFLIES					
O. Plecoptera					
F. Capniidae					
immature	0	0	0	0	0
TRUE FLIES					
O. Diptera					
BITING-MIDGE					
F. Ceratopogonidae					
Culicoides	0	0	0	0	0
MIDGES					
F. Chironomidae					
chironomid pupae	**7**	**14**	**7**	**29**	**47**
S.F. Chironominae					
Micropsectra	0	0	0	4	0
Paratanytarsus	0	0	0	11	4
Polypedilum	0	0	0	0	0
Stictochironomus	4	0	0	0	4
Tanytarsus	0	4	0	0	0
S.F. Diamesinae					
Diamesa	0	0	0	0	0
Pseudokiefferiella	280	190	50	574	750
S.F. Orthocladiinae					
Chaetocladius	4	0	0	0	0
Cardiocladius	187	187	283	122	201
Corynoneura	0	0	0	0	0
Cricotopus	29	36	39	111	305
Cricotopus/Orthocladius	0	4	14	0	25
Diplocladius	0	0	0	0	47
Eukiefferiella	0	0	0	0	0
Hydrobaenus	0	11	108	50	4
Hydrosmittia	54	47	47	108	118
Krenosmittia	0	0	0	11	11
Limnophyes	14	0	7	14	11
Orthocladius (Euorthocladius)	0	0	0	36	11
Parakiefferiella	11	4	14	0	0
Paraphaenocladius	0	7	7	4	18
Thienemanniella	0	0	14	0	0

Table F.35: Benthic invertebrate community data for Mary River, August 2016. Densities expressed in number of organisms per square meter.

Station	CO-05 Lower Mine-Exposed				
Replicate	B1	B2	B3	B4	B5
Tokunagaia	97	129	43	136	233
Tvetenia	4	11	4	14	36
indeterminate	0	0	**4**	0	0
S.F. Tanypodinae					
Thienemannimyia complex	7	4	7	50	36
F. Empididae					
Clinocera	0	4	0	0	14
F. Simuliidae					
Gymnopais	0	0	0	0	4
Metacnephia	4	0	0	0	0
Prosimulium/Helodon	0	0	0	4	0
indeterminate	**7**	**7**	0	0	0
F. Tipulidae					
Dicranota	0	0	0	11	4
Tipula	7	7	22	25	43
Number of Organisms (No. organisms per m	770	734	771	1,490	2,038
Richness (total number of taxa)[a]	16	18	18	22	24
Simpson's Evenness (E)	0.831	0.865	0.862	0.847	0.838
Bray-Curtis Index	0.636	0.563	0.692	0.624	0.716
Percent Composition					
% Nemata	2.3%	1.0%	0.5%	2.6%	1.1%
% Oligochaeta	0.0%	1.0%	2.9%	0.3%	1.1%
% Hydracarina	4.7%	7.4%	9.7%	7.2%	3.3%
% Ostracods	0.5%	0.0%	0.9%	0.3%	0.0%
% Chironomids	90.6%	88.3%	84.0%	85.5%	91.3%
% Metal Sensitive Chironmids	36.4%	26.4%	6.5%	39.5%	37.0%
% Tipulidae	0.9%	1.0%	2.9%	2.4%	2.3%
Functional Feeding Group Composition					
% Shredders	4.7%	6.5%	9.9%	9.3%	18.7%
% Collector - Gatherers	64.3%	57.5%	42.9%	69.9%	64.7%
% Filterers	1.4%	1.5%	0.0%	1.3%	0.4%
Habitat Preference Group Composition					
% Clingers	9.4%	15.0%	15.8%	14.9%	20.9%
% Sprawlers	62.3%	56.1%	40.5%	72.1%	64.6%
% Burrowers	28.3%	28.9%	43.7%	13.0%	14.6%

[a] Bold entries excluded from taxa count

Table F.36: Benthic invertebrate community summary statistics for Mary River, Mary River Project CREMP, August 2016. Sample size equals five for all study areas.

Metric	Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
					Lower Bound	Upper Bound		
Density (no. organisms / m^2)	GO-09 Reference Area	662	320	143	265	1,059	334	1,162
	GO-03 Upstream Area	287	92	41	172	401	187	425
	EO-01 Upper Mine-Exposed Area	230	109	49	95	365	113	343
	EO-20 Middle Mine-Exposed Area	283	118	53	137	429	160	458
	CO-05 Lower Mine-Exposed Area	1,161	584	261	435	1,886	734	2,038
Richness (Number of Taxa)	GO-09 Reference Area	14.0	1.6	0.7	12.0	16.0	12.0	16.0
	GO-03 Upstream Area	14.4	1.8	0.8	12.1	16.7	12.0	17.0
	EO-01 Upper Mine-Exposed Area	13.2	4.1	1.9	8.1	18.3	8.0	18.0
	EO-20 Middle Mine-Exposed Area	13.6	3.1	1.4	9.7	17.5	11.0	17.0
	CO-05 Lower Mine-Exposed Area	19.6	3.3	1.5	15.5	23.7	16.0	24.0
Simpson's Evenness	GO-09 Reference Area	0.907	0.023	0.010	0.878	0.935	0.875	0.932
	GO-03 Upstream Area	0.899	0.041	0.018	0.848	0.949	0.841	0.942
	EO-01 Upper Mine-Exposed Area	0.865	0.037	0.016	0.820	0.911	0.820	0.913
	EO-20 Middle Mine-Exposed Area	0.835	0.038	0.017	0.787	0.882	0.789	0.873
	CO-05 Lower Mine-Exposed Area	0.848	0.015	0.007	0.830	0.867	0.831	0.865
Bray-Curtis Index	GO-09 Reference Area	0.277	0.097	0.043	0.156	0.397	0.142	0.385
	GO-03 Upstream Area	0.490	0.117	0.053	0.344	0.636	0.300	0.613
	EO-01 Upper Mine-Exposed Area	0.600	0.136	0.061	0.431	0.769	0.440	0.738
	EO-20 Middle Mine-Exposed Area	0.535	0.093	0.042	0.419	0.651	0.431	0.664
	CO-05 Lower Mine-Exposed Area	0.646	0.060	0.027	0.571	0.721	0.563	0.716
Hydracarina (% of community)	GO-09 Reference Area	4.8%	2.1%	1.0%	2.2%	7.5%	2.5%	7.3%
	GO-03 Upstream Area	9.8%	4.6%	2.0%	4.2%	15.5%	4.3%	15.5%
	EO-01 Upper Mine-Exposed Area	7.2%	4.6%	2.0%	1.5%	12.9%	0.0%	10.5%
	EO-20 Middle Mine-Exposed Area	6.4%	3.0%	1.3%	2.8%	10.1%	1.8%	9.4%
	CO-05 Lower Mine-Exposed Area	6.5%	2.5%	1.1%	3.4%	9.6%	3.3%	9.7%
Chironomidae (% of community)	GO-09 Reference Area	84.2%	4.6%	2.1%	78.4%	90.0%	78.2%	88.3%
	GO-03 Upstream Area	77.6%	7.3%	3.3%	68.5%	86.7%	68.7%	88.2%
	EO-01 Upper Mine-Exposed Area	82.8%	7.2%	3.2%	73.9%	91.7%	72.9%	89.5%
	EO-20 Middle Mine-Exposed Area	86.2%	6.3%	2.8%	78.3%	94.1%	75.8%	91.7%
	CO-05 Lower Mine-Exposed Area	88.0%	3.2%	1.4%	84.0%	91.9%	84.0%	91.3%
Metal-Sensitive Chironomidae (% of community)	GO-09 Reference Area	23.4%	12.3%	5.5%	8.1%	38.6%	11.5%	43.3%
	GO-03 Upstream Area	8.8%	5.9%	2.7%	1.4%	16.2%	2.1%	15.7%
	EO-01 Upper Mine-Exposed Area	5.7%	4.7%	2.1%	-0.1%	11.5%	0.0%	11.3%
	EO-20 Middle Mine-Exposed Area	4.3%	2.9%	1.3%	0.8%	7.9%	1.8%	7.9%
	CO-05 Lower Mine-Exposed Area	29.2%	13.6%	6.1%	12.2%	46.1%	6.5%	39.5%
Tipulidae (% of community)	GO-09 Reference Area	1.9%	1.6%	0.7%	0.0%	3.9%	0.0%	4.2%
	GO-03 Upstream Area	8.5%	7.0%	3.1%	-0.2%	17.2%	0.9%	18.9%
	EO-01 Upper Mine-Exposed Area	3.2%	2.2%	1.0%	0.4%	5.9%	0.0%	5.4%
	EO-20 Middle Mine-Exposed Area	4.3%	4.8%	2.2%	-1.7%	10.3%	0.0%	12.4%
	CO-05 Lower Mine-Exposed Area	1.9%	0.9%	0.4%	0.8%	3.0%	0.9%	2.9%
Shredder FFG (% of community)	GO-09 Reference Area	12.0%	3.7%	1.6%	7.5%	16.6%	7.8%	15.3%
	GO-03 Upstream Area	20.7%	5.5%	2.5%	13.8%	27.6%	14.7%	29.3%
	EO-01 Upper Mine-Exposed Area	8.2%	6.9%	3.1%	-0.4%	16.7%	3.0%	19.9%
	EO-20 Middle Mine-Exposed Area	8.4%	5.3%	2.4%	1.8%	15.0%	3.5%	16.6%
	CO-05 Lower Mine-Exposed Area	9.8%	5.4%	2.4%	3.1%	16.5%	4.7%	18.7%
Collector-Gatherer FFG (% of community)	GO-09 Reference Area	75.4%	9.1%	4.1%	64.0%	86.7%	61.8%	84.2%
	GO-03 Upstream Area	64.0%	6.1%	2.7%	56.4%	71.6%	54.0%	69.0%
	EO-01 Upper Mine-Exposed Area	77.6%	6.8%	3.0%	69.2%	86.1%	67.9%	86.5%
	EO-20 Middle Mine-Exposed Area	70.5%	7.5%	3.4%	61.1%	79.9%	61.7%	81.1%
	CO-05 Lower Mine-Exposed Area	59.9%	10.4%	4.7%	46.9%	72.8%	42.9%	69.9%
Filterer FFG (% of community)	GO-09 Reference Area	7.3%	4.3%	1.9%	2.0%	12.6%	2.1%	13.4%
	GO-03 Upstream Area	0.6%	0.9%	0.4%	-0.4%	1.7%	0.0%	1.6%
	EO-01 Upper Mine-Exposed Area	0.9%	0.8%	0.4%	-0.2%	1.9%	0.0%	1.8%
	EO-20 Middle Mine-Exposed Area	0.4%	0.8%	0.4%	-0.6%	1.3%	0.0%	1.8%
	CO-05 Lower Mine-Exposed Area	0.9%	0.7%	0.3%	0.1%	1.8%	0.0%	1.5%
Clinger HPG (% of community)	GO-09 Reference Area	22.3%	8.7%	3.9%	11.4%	33.1%	13.3%	34.9%
	GO-03 Upstream Area	22.6%	6.0%	2.7%	15.2%	30.1%	12.8%	28.2%
	EO-01 Upper Mine-Exposed Area	13.4%	8.0%	3.6%	3.5%	23.4%	0.0%	21.1%
	EO-20 Middle Mine-Exposed Area	11.3%	4.5%	2.0%	5.8%	16.9%	5.3%	15.6%
	CO-05 Lower Mine-Exposed Area	15.2%	4.1%	1.8%	10.1%	20.3%	9.4%	20.9%
Sprawler HPG (% of community)	GO-09 Reference Area	73.7%	8.3%	3.7%	63.4%	83.9%	61.8%	81.0%
	GO-03 Upstream Area	61.1%	5.9%	2.6%	53.8%	68.4%	51.3%	66.8%
	EO-01 Upper Mine-Exposed Area	74.0%	7.9%	3.5%	64.2%	83.9%	67.3%	86.5%
	EO-20 Middle Mine-Exposed Area	68.9%	7.6%	3.4%	59.5%	78.3%	60.5%	79.4%
	CO-05 Lower Mine-Exposed Area	59.1%	11.9%	5.3%	44.4%	73.9%	40.5%	72.1%
Burrower HPG (% of community)	GO-09 Reference Area	4.1%	2.0%	0.9%	1.5%	6.6%	1.2%	6.3%
	GO-03 Upstream Area	16.3%	11.3%	5.0%	2.3%	30.3%	8.0%	35.8%
	EO-01 Upper Mine-Exposed Area	12.6%	10.5%	4.7%	-0.4%	25.5%	0.0%	28.3%
	EO-20 Middle Mine-Exposed Area	19.8%	5.0%	2.3%	13.5%	26.0%	13.8%	25.1%
	CO-05 Lower Mine-Exposed Area	25.7%	12.5%	5.6%	10.1%	41.2%	13.0%	43.7%

Table F.37: Benthic invertebrate community statistical comparisons between individual Mary River reference (GO-09), upstream (GO-03) and mine-exposed (EO-01, EO-20, CO-05) study areas, Mary River Project CREMP, August 2016. Shading indicates a signficant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 5-group Comparison			Pair-wise, post-hoc comparisons[a]					
	Significant Difference Among Areas?	p-value	Statistical Test [b]	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Magnitude of Difference	Statistical Test
Density	YES	0.0004	α , ε	GO-09	GO-03	NO	0.4423	-	Tamhane's
				GO-09	EO-01	NO	0.3084	-	
				GO-09	EO-20	NO	0.4316	-	
				GO-09	CO-05	NO	0.7873	-	
				GO-03	EO-01	NO	0.9939	-	
				GO-03	EO-20	NO	1.0000	-	
				GO-03	CO-05	NO	0.2450	-	
				EO-01	EO-20	NO	0.9985	-	
				EO-01	CO-05	NO	0.2016	-	
				EO-20	CO-05	NO	0.2381	-	
Richness	YES	0.0359	η , γ	GO-09	GO-03	NO	1.0000	-	Tamhane's
				GO-09	EO-01	NO	0.9998	-	
				GO-09	EO-20	NO	1.0000	-	
				GO-09	CO-05	YES	0.0740	3.5	
				GO-03	EO-01	NO	0.9984	-	
				GO-03	EO-20	NO	0.9997	-	
				GO-03	CO-05	NO	0.1191	-	
				EO-01	EO-20	NO	1.0000	-	
				EO-01	CO-05	NO	0.3687	-	
				EO-20	CO-05	NO	0.1734	-	
Simpson's Evenness	YES	0.0081	α , ε	GO-09	GO-03	NO	0.9944	-	Tukey's HSD
				GO-09	EO-01	NO	0.2905	-	
				GO-09	EO-20	YES	0.0166	-3.1	
				GO-09	CO-05	YES	0.0664	-2.6	
				GO-03	EO-01	NO	0.4967	-	
				GO-03	EO-20	YES	0.0386	-1.6	
				GO-03	CO-05	NO	0.1411	-	
				EO-01	EO-20	NO	0.5816	-	
				EO-01	CO-05	NO	0.9192	-	
				EO-20	CO-05	NO	0.9625	-	
Bray Curtis Index	YES	0.0002	α , ε	GO-09	GO-03	YES	0.0298	2.2	Tukey's HSD
				GO-09	EO-01	YES	0.0007	3.3	
				GO-09	EO-20	YES	0.0067	2.7	
				GO-09	CO-05	YES	0.0001	3.8	
				GO-03	EO-01	NO	0.4727	-	
				GO-03	EO-20	NO	0.9579	-	
				GO-03	CO-05	NO	0.1634	-	
				EO-01	EO-20	NO	0.8575	-	
				EO-01	CO-05	NO	0.9533	-	
				EO-20	CO-05	NO	0.4609	-	
Hydracarina (% of community)	NO	0.6360	β , γ	GO-09	GO-03	NO	0.5849	-	Tukey's HSD
				GO-09	EO-01	NO	0.9996	-	
				GO-09	EO-20	NO	0.9821	-	
				GO-09	CO-05	NO	0.9718	-	
				GO-03	EO-01	NO	0.7078	-	
				GO-03	EO-20	NO	0.8763	-	
				GO-03	CO-05	NO	0.9038	-	
				EO-01	EO-20	NO	0.9971	-	
				EO-01	CO-05	NO	0.9939	-	
				EO-20	CO-05	NO	1.0000	-	

Table F.37: Benthic invertebrate community statistical comparisons between individual Mary River reference (GO-09), upstream (GO-03) and mine-exposed (EO-01, EO-20, CO-05) study areas, Mary River Project CREMP, August 2016. Shading indicates a signficant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 5-group Comparison			Pair-wise, post-hoc comparisons[a]					
	Significant Difference Among Areas?	p-value	Statistical Test [b]	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Magnitude of Difference	Statistical Test
Chironomidae (% of community)	NO	0.1351	β , ε	GO-09	GO-03	NO	0.5923	-	Tukey's HSD
				GO-09	EO-01	NO	0.9999	-	
				GO-09	EO-20	NO	0.9298	-	
				GO-09	CO-05	NO	0.8097	-	
				GO-03	EO-01	NO	0.6706	-	
				GO-03	EO-20	NO	0.1982	-	
				GO-03	CO-05	NO	0.1168	-	
				EO-01	EO-20	NO	0.8848	-	
				EO-01	CO-05	NO	0.7404	-	
				EO-20	CO-05	NO	0.9982	-	
Metal Sensitive Taxa (% of community)	YES	0.0035	β , γ	GO-09	GO-03	NO	0.3268	-	Tukey's HSD
				GO-09	EO-01	YES	0.0321	-1.4	
				GO-09	EO-20	YES	0.0469	-1.6	
				GO-09	CO-05	NO	0.9960	-	
				GO-03	EO-01	NO	0.7174	-	
				GO-03	EO-20	NO	0.8157	-	
				GO-03	CO-05	NO	0.1836	-	
				EO-01	EO-20	NO	0.9997	-	
				EO-01	CO-05	YES	0.0147	5.0	
				EO-20	CO-05	YES	0.0219	8.7	
Tipulidae (% of community)	NO	0.2858	β , ε	GO-09	GO-03	NO	0.2031	-	Tukey's HSD
				GO-09	EO-01	NO	0.8043	-	
				GO-09	EO-20	NO	0.7770	-	
				GO-09	CO-05	NO	0.9632	-	
				GO-03	EO-01	NO	0.7798	-	
				GO-03	EO-20	NO	0.8069	-	
				GO-03	CO-05	NO	0.5197	-	
				EO-01	EO-20	NO	1.0000	-	
				EO-01	CO-05	NO	0.9914	-	
				EO-20	CO-05	NO	0.9869	-	
Shredder FFG (% of community)	YES	0.0167	β , ε	GO-09	GO-03	NO	0.3690	-	Tukey's HSD
				GO-09	EO-01	NO	0.5100	-	
				GO-09	EO-20	NO	0.6618	-	
				GO-09	CO-05	NO	0.9182	-	
				GO-03	EO-01	YES	0.0183	-2.3	
				GO-03	EO-20	YES	0.0314	-2.2	
				GO-03	CO-05	YES	0.0911	-2.0	
				EO-01	EO-20	NO	0.9990	-	
				EO-01	CO-05	NO	0.9342	-	
				EO-20	CO-05	NO	0.9837	-	
Collector-Gatherer FFG (% of community)	YES	0.0108	β , ε	GO-09	GO-03	NO	0.2018	-	Tukey's HSD
				GO-09	EO-01	NO	0.9817	-	
				GO-09	EO-20	NO	0.8440	-	
				GO-09	CO-05	YES	0.0533	-1.7	
				GO-03	EO-01	YES	0.0745	2.2	
				GO-03	EO-20	NO	0.7325	-	
				GO-03	CO-05	NO	0.9519	-	
				EO-01	EO-20	NO	0.5380	-	
				EO-01	CO-05	YES	0.0169	-2.6	
				EO-20	CO-05	NO	0.3282	-	

Table F.37: Benthic invertebrate community statistical comparisons between individual Mary River reference (GO-09), upstream (GO-03) and mine-exposed (EO-01, EO-20, CO-05) study areas, Mary River Project CREMP, August 2016. Shading indicates a signficant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 5-group Comparison			Pair-wise, post-hoc comparisons[a]					
	Significant Difference Among Areas?	p-value	Statistical Test [b]	(I) Area	(J) Area	Significant Difference Between Areas?	p-value	Magnitude of Difference	Statistical Test
Filterer FFG (% of community)	YES	0.0017	β , ε	GO-09	GO-03	YES	0.0072	-1.6	Tukey's HSD
				GO-09	EO-01	YES	0.0586	-1.5	
				GO-09	EO-20	YES	0.0013	-1.6	
				GO-09	CO-05	YES	0.0150	-1.5	
				GO-03	EO-01	NO	0.8616	-	
				GO-03	EO-20	NO	0.9431	-	
				GO-03	CO-05	NO	0.9970	-	
				EO-01	EO-20	NO	0.4429	-	
				EO-01	CO-05	NO	0.9659	-	
				EO-20	CO-05	NO	0.8146	-	
Clinger HPG (% of community)	NO	0.2101	β , γ	GO-09	GO-03	NO	1.0000	-	Tamhane's
				GO-09	EO-01	NO	0.9402	-	
				GO-09	EO-20	NO	0.2910	-	
				GO-09	CO-05	NO	0.7735	-	
				GO-03	EO-01	NO	0.9210	-	
				GO-03	EO-20	NO	0.1630	-	
				GO-03	CO-05	NO	0.4643	-	
				EO-01	EO-20	NO	1.0000	-	
				EO-01	CO-05	NO	0.9984	-	
				EO-20	CO-05	NO	0.9200	-	
Sprawler HPG (% of community)	YES	0.0316	β , ε	GO-09	GO-03	NO	0.1881	-	Tukey's HSD
				GO-09	EO-01	NO	0.9997	-	
				GO-09	EO-20	NO	0.8930	-	
				GO-09	CO-05	NO	0.1073	-	
				GO-03	EO-01	NO	0.1360	-	
				GO-03	EO-20	NO	0.6396	-	
				GO-03	CO-05	NO	0.9978	-	
				EO-01	EO-20	NO	0.8119	-	
				EO-01	CO-05	YES	0.0753	-1.9	
				EO-20	CO-05	NO	0.4541	-	
Burrower HPG (% of community)	YES	0.0151	β , ε	GO-09	GO-03	NO	0.1384	-	Tukey's HSD
				GO-09	EO-01	NO	0.7398	-	
				GO-09	EO-20	YES	0.0460	7.8	
				GO-09	CO-05	YES	0.0186	10.7	
				GO-03	EO-01	NO	0.7251	-	
				GO-03	EO-20	NO	0.9786	-	
				GO-03	CO-05	NO	0.8551	-	
				EO-01	EO-20	NO	0.3944	-	
				EO-01	CO-05	NO	0.2057	-	
				EO-20	CO-05	NO	0.9924	-	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed; η - data log transformed; β - data logit transformed; ε - single factor ANOVA test conducted; γ - ANOVA validated using Kruskal-Wallis

Table F.38: Statistical comparison of benthic metrics at the Mary River reference area (GO-09) among years of mine operation (2015, 2016) and baseline (2006, 2007) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	NO	0.2834	α , ε	2006	2007	NO	0.3796	Tukey's HSD
				2006	2015	NO	0.9805	
				2006	2016	NO	0.5022	
				2007	2015	NO	0.4738	
				2007	2016	NO	0.9720	
				2015	2016	NO	0.6264	
Richness	YES	0.0156	η , γ	2006	2007	NO	0.5742	Tamhane's
				2006	2015	NO	0.7611	
				2006	2016	NO	0.5216	
				2007	2015	NO	0.7554	
				2007	2016	NO	0.9768	
				2015	2016	NO	0.6023	
Simpson's Evenness	YES	0.0000	α , γ	2006	2007	YES	0.0000	Tukey's HSD
				2006	2015	YES	0.0000	
				2006	2016	YES	0.0000	
				2007	2015	YES	0.0004	
				2007	2016	YES	0.0001	
				2015	2016	NO	0.8210	
Hydracarina (% of community)	YES	0.0023	β , ε	2006	2007	NO	1.0000	Tamhane's
				2006	2015	NO	0.4449	
				2006	2016	NO	0.4083	
				2007	2015	NO	0.3299	
				2007	2016	NO	0.3082	
				2015	2016	NO	0.9855	
Chironomidae (% of community)	YES	0.0000	β , ε	2006	2007	YES	0.0967	Tukey's HSD
				2006	2015	YES	0.0000	
				2006	2016	YES	0.0000	
				2007	2015	YES	0.0006	
				2007	2016	YES	0.0001	
				2015	2016	NO	0.6145	
Metal Sensitive Taxa (% of community)	YES	0.0043	β , γ	2006	2007	NO	0.1759	Tamhane's
				2006	2015	YES	0.0025	
				2006	2016	YES	0.0411	
				2007	2015	NO	0.1676	
				2007	2016	NO	0.9262	
				2015	2016	NO	0.2865	
Tipulidae (% of community)	YES	0.0942	β , γ	2006	2007	NO	0.5893	Tukey's HSD
				2006	2015	YES	0.0676	
				2006	2016	NO	0.5203	
				2007	2015	NO	0.5467	
				2007	2016	NO	1.0000	
				2015	2016	NO	0.4124	
Shredder FFG (% of community)	YES	0.0006	β , ε	2006	2007	YES	0.0183	Tukey's HSD
				2006	2015	YES	0.0008	
				2006	2016	YES	0.0007	
				2007	2015	NO	0.4824	
				2007	2016	NO	0.4368	
				2015	2016	NO	0.9996	
Collector-Gatherer FFG (% of community)	YES	0.0001	β , ε	2006	2007	YES	0.0502	Tukey's HSD
				2006	2015	YES	0.0003	
				2006	2016	YES	0.0001	
				2007	2015	YES	0.0691	
				2007	2016	YES	0.0299	
				2015	2016	NO	0.9419	
Filterer FFG (% of community)	YES	0.0005	β , ε	2006	2007	NO	0.9988	Tukey's HSD
				2006	2015	NO	0.1018	
				2006	2016	YES	0.0014	
				2007	2015	YES	0.0773	
				2007	2016	YES	0.0011	
				2015	2016	YES	0.0583	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed; η - data log transformed; β - data logit transformed; ε - single factor ANOVA test conducted; γ - ANOVA validated using Kruskal-Wallis H-test.

Table F.39: Statistical comparison of benthic metrics at Mary River GO-03 upstream study area among years of mine operation (2015, 2016) and baseline (2007) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	NO	0.1071	α	2007	2015	NO	0.9194	Tukey's HSD
				2007	2016	NO	0.9597	
				2015	2016	NO	0.9938	
Richness	YES	0.0137	η , ζ	2007	2015	YES	0.0006	Tukey's HSD
				2007	2016	NO	0.8253	
				2015	2016	YES	0.0024	
Simpson's Evenness	YES	0.0000	α , ζ	2007	2015	NO	0.4686	Tamhane's
				2007	2016	NO	0.4775	
				2015	2016	NO	0.9999	
Hydracarina (% of Community)	YES	0.0007	β	2007	2015	NO	0.1454	Tukey's HSD
				2007	2016	NO	0.6097	
				2015	2016	NO	0.5813	
Chironomidae (% of Community)	YES	0.0000	β	2007	2015	YES	0.0540	Tukey's HSD
				2007	2016	YES	0.0193	
				2015	2016	NO	0.8058	
Metal Sensitive Taxa (% of Community)	NO	0.9176	β , ζ	2007	2015	NO	0.7289	Tamhane's
				2007	2016	NO	0.9976	
				2015	2016	NO	0.7472	
Tipulidae (% of Community)	YES	0.0145	β	2007	2015	YES	0.0172	Tukey's HSD
				2007	2016	YES	0.0192	
				2015	2016	NO	0.9973	
Shredder FFG (% of Community)	YES	0.0000	β	2007	2015	YES	0.0363	Tukey's HSD
				2007	2016	YES	0.0240	
				2015	2016	NO	0.9648	
Collector-Gatherer FFG (% of Community)	YES	0.0000	β	2007	2015	NO	0.5212	Tukey's HSD
				2007	2016	NO	0.1038	
				2015	2016	NO	0.5424	
Filterer FFG (% of Commmunity)	NO	0.5382	β	2007	2015	YES	0.0401	Tamhane's
				2007	2016	NO	0.9975	
				2015	2016	YES	0.0453	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted;

Table F.40: Statistical comparison of benthic metrics at Mary River EO-01 upper mine-exposed area among years of mine operation (2015, 2016) and baseline (2007) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	YES	0.0304	α	2007	2015	NO	0.5041	Tamhane's
				2007	2016	NO	0.6066	
				2015	2016	NO	0.3123	
Richness	NO	0.0799	α	2007	2015	NO	0.4992	Tamhane's
				2007	2016	NO	0.9284	
				2015	2016	NO	0.1296	
Simpson's Evenness	YES	0.0127	α , ζ	2007	2015	YES	0.0158	Tukey's HSD
				2007	2016	YES	0.0205	
				2015	2016	NO	0.9820	
Hydracarina (% of Community)	NO	0.0996	β , ζ	2007	2015	NO	0.2801	Tukey's HSD
				2007	2016	NO	0.0847	
				2015	2016	NO	0.6443	
Chironomidae (% of Community)	NO	0.3363	β	2007	2015	NO	0.3987	Tukey's HSD
				2007	2016	NO	0.3537	
				2015	2016	NO	0.9934	
Metal Sensitive Taxa (% of Community)	NO	0.3959	β	2007	2015	NO	0.6086	Tukey's HSD
				2007	2016	NO	0.3666	
				2015	2016	NO	0.8644	
Tipulidae (% of Community)	NO	0.1503	β	2007	2015	NO	0.1830	Tukey's HSD
				2007	2016	NO	0.8940	
				2015	2016	NO	0.2542	
Shredder FFG (% of Community)	NO	0.1948	β	2007	2015	NO	0.2771	Tukey's HSD
				2007	2016	NO	0.9852	
				2015	2016	NO	0.2539	
Collector-Gatherer FFG (% of Community)	NO	0.0593	β	2007	2015	NO	0.1030	Tukey's HSD
				2007	2016	NO	0.0603	
				2015	2016	NO	0.9226	
Filterer FFG (% of Commmunity)	YES	0.0212	β	2007	2015	NO	0.4095	Tamhane's
				2007	2016	NO	0.4930	
				2015	2016	NO	0.7822	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted;
β - data probit transformed, single factor ANOVA test conducted;

Table F.41: Statistical comparison of benthic metrics at Mary River EO-20 middle mine-exposed area among years of mine operation (2015, 2016) and baseline (2011) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	YES	0.0043	α	2011	2015	YES	0.0062	Tukey's HSD
				2011	2016	YES	0.0065	
				2015	2016	NO	0.9992	
Richness	NO	0.3955	η , ζ	2011	2015	NO	0.4513	Tukey's HSD
				2011	2016	NO	0.9667	
				2015	2016	NO	0.5018	
Simpson's Evenness	YES	0.0229	α	2011	2015	NO	0.1002	Tukey's HSD
				2011	2016	YES	0.0185	
				2015	2016	NO	0.4811	
Hydracarina (% of Community)	YES	0.0021	β	2011	2015	YES	0.0098	Tukey's HSD
				2011	2016	YES	0.0018	
				2015	2016	NO	0.4478	
Chironomidae (% of Community)	YES	0.0369	β	2011	2015	YES	0.0597	Tukey's HSD
				2011	2016	YES	0.0413	
				2015	2016	NO	0.9637	
Metal Sensitive Taxa (% of Community)	NO	0.0932	β	2011	2015	NO	0.1261	Tukey's HSD
				2011	2016	NO	0.1065	
				2015	2016	NO	0.9915	
Tipulidae (% of Community)	NO	0.4475	β	2011	2015	NO	0.4246	Tukey's HSD
				2011	2016	NO	0.7958	
				2015	2016	NO	0.7383	
Shredder FFG (% of Community)	NO	0.1220	β	2011	2015	NO	0.1092	Tukey's HSD
				2011	2016	NO	0.5242	
				2015	2016	NO	0.4202	
Collector-Gatherer FFG (% of Community)	YES	0.0003	β	2011	2015	YES	0.0003	Tukey's HSD
				2011	2016	YES	0.0009	
				2015	2016	NO	0.6429	
Filterer FFG (% of Commmunity)	NO	0.8918	β	2011	2015	NO	0.9807	Tukey's HSD
				2011	2016	NO	0.9718	
				2015	2016	NO	0.8818	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted;

Table F.42: Statistical comparison of benthic metrics at the Mary River lower mine-exposed area (CO-05) among years of mine operation (2015, 2016) and baseline (2007, 2011) for the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 4-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	YES	0.0172	α , ε	2007	2011	NO	0.9948	Tamhane's
				2007	2015	NO	0.9981	
				2007	2016	NO	0.1653	
				2011	2015	NO	0.9670	
				2011	2016	NO	0.5569	
				2015	2016	NO	0.1213	
Richness	YES	0.0073	α , ε	2007	2011	YES	0.0420	Tukey's HSD
				2007	2015	NO	0.7284	
				2007	2016	YES	0.0145	
				2011	2015	NO	0.1324	
				2011	2016	NO	0.9944	
				2015	2016	YES	0.0440	
Simpson's Evenness	YES	0.0000	α , ε	2007	2011	NO	0.1947	Tamhane's
				2007	2015	YES	0.0001	
				2007	2016	YES	0.0046	
				2011	2015	NO	0.9694	
				2011	2016	NO	0.9937	
				2015	2016	YES	0.0521	
Hydracarina (% of community)	YES	0.0346	β , ε	2007	2011	NO	0.9999	Tukey's HSD
				2007	2015	NO	0.9452	
				2007	2016	YES	0.0748	
				2011	2015	NO	0.9239	
				2011	2016	YES	0.0663	
				2015	2016	NO	0.1063	
Chironomidae (% of community)	YES	0.0000	β , ε	2007	2011	YES	0.0003	Tukey's HSD
				2007	2015	YES	0.0000	
				2007	2016	YES	0.0000	
				2011	2015	YES	0.0542	
				2011	2016	NO	0.8000	
				2015	2016	NO	0.1470	
Metal Sensitive Taxa (% of community)	NO	0.2045	β , γ	2007	2011	NO	0.2442	Tukey's HSD
				2007	2015	NO	0.3593	
				2007	2016	NO	0.8933	
				2011	2015	NO	0.9542	
				2011	2016	NO	0.4554	
				2015	2016	NO	0.6594	
Tipulidae (% of community)	NO	0.2263	β , ε	2007	2011	NO	0.4419	Tukey's HSD
				2007	2015	NO	0.2661	
				2007	2016	NO	0.2167	
				2011	2015	NO	0.9969	
				2011	2016	NO	0.9855	
				2015	2016	NO	0.9984	
Shredder FFG (% of community)	YES	0.0353	β , ε	2007	2011	YES	0.0311	Tukey's HSD
				2007	2015	NO	0.2044	
				2007	2016	YES	0.0689	
				2011	2015	NO	0.4603	
				2011	2016	NO	0.8334	
				2015	2016	NO	0.8646	
Collector-Gatherer FFG (% of community)	YES	0.0080	β , ε	2007	2011	NO	0.1437	Tukey's HSD
				2007	2015	YES	0.0053	
				2007	2016	NO	0.2621	
				2011	2015	NO	0.3932	
				2011	2016	NO	0.9060	
				2015	2016	YES	0.0831	
Filterer FFG (% of community)	YES	0.0170	β , γ	2007	2011	NO	1.0000	Tukey's HSD
				2007	2015	YES	0.0745	
				2007	2016	YES	0.0688	
				2011	2015	YES	0.0747	
				2011	2016	YES	0.0690	
				2015	2016	NO	0.9999	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed; η - data log transformed; β - data probit transformed; ε - single factor ANOVA test conducted; γ - ANOVA validated using Kruskal-Wallis H-test

Table F.43: Benthic invertebrate community data for Mary Lake, August 2016. Densities expressed in number of organisms per square meter.

Station	Mary Lake - Littoral Stations 2016					
Replicate	BLO-1	BLO-6	BLO-11	BLO-20	BLO-21	BLO-22
ROUNDWORMS						
P. Nemata	9	86	0	0	26	9
ANNELIDS						
P. Annelida						
WORMS						
Cl. Oligochaeta						
F. Lumbriculidae						
Lumbriculus	0	0	0	0	0	0
ARTHROPODS						
P. Arthropoda						
MITES						
Cl. Arachnida						
O. Acarina						
immature	0	0	**17**	0	0	0
F. Acalyptonotidae						
Acalyptonotus	52	52	17	0	9	9
F. Hygrobatidae						
Hygrobates	9	0	0	0	0	0
F. Lebertiidae						
Lebertia	0	0	9	34	0	0
HARPACTICOIDS						
O. Harpacticoida	0	0	0	0	0	0
SEED SHRIMPS						
Cl. Ostracoda	164	17	9	0	0	52
WATER SCUDS						
O. Amphipoda						
F. Hyalellidae						
Hyalella	0	0	9	0	0	0
INSECTS						
Cl. Insecta						
CADDISFLIES						
O. Trichoptera						
F. Apataniidae						
Apatania	0	0	0	0	0	0
TRUE FLIES						
O. Diptera						
MIDGES						
F. Chironomidae						
chironomid pupae	0	0	0	0	0	9
S.F. Chironominae						
Chironomus	0	0	0	302	0	0
Micropsectra	905	0	60	1,233	129	9
Parachironomus	0	0	0	0	0	0
Paratanytarsus	0	0	0	0	0	0
Sergentia	0	0	0	190	0	0
Stictochironomus	776	0	0	1,793	0	0
Tanytarsus	121	0	0	0	0	0
S.F. Diamesinae						
Diamesa	0	60	26	34	9	0
Pseudodiamesa	0	95	9	0	9	9
S.F. Orthocladiinae						
Abiskomyia	190	26	0	78	0	0
Cricotopus/Orthocladius	0	0	0	0	0	0
Heterotrissocladius	0	78	741	78	1,129	914
Paracladius	0	0	0	0	0	0
Parakiefferiella	0	0	0	0	0	0
Psectrocladius	0	0	0	0	0	0
Zalutschia	0	34	0	0	9	9
Genus *"Greenland"*	0	0	0	0	0	0

Table F.43: Benthic invertebrate community data for Mary Lake, August 2016. Densities expressed in number of organisms per square meter.

Station	Mary Lake - Littoral Stations 2016					
Replicate	BLO-1	BLO-6	BLO-11	BLO-20	BLO-21	BLO-22
S.F. Tanypodinae						
Arctopelopia	0	0	0	0	0	0
Procladius	1,810	9	9	155	17	26
CRANE FLIES						
F. Tipulidae						
Dicranota	0	0	0	0	0	0
Density (No. organisms per m^2)	4,036	457	906	3,897	1,337	1,046
Richness (total number of taxa)[a]	9	9	9	9	8	8
Simpson's Evenness (E)	0.795	0.958	0.365	0.762	0.316	0.249
Bray-Curtis Index	0.642	0.839	0.877	0.805	0.854	0.902
Percent Composition						
% Nemata	0.2%	18.8%	0.0%	0.0%	1.9%	0.9%
% Hydracarina	1.5%	11.4%	4.7%	0.9%	0.7%	0.9%
% Ostracods	4.1%	3.7%	1.0%	0.0%	0.0%	5.0%
% Chironomids	94.2%	66.1%	93.3%	99.1%	97.4%	93.3%
% Metal Sensitive Chironmids	25.4%	33.9%	10.5%	32.5%	11.0%	1.7%
Functional Feeding Group Composition						
% Shredders	0.0%	7.4%	0.0%	0.0%	0.7%	0.9%
% Collector - Gatherers	28.2%	79.2%	87.6%	63.5%	87.7%	94.9%
% Filterers	25.4%	0.0%	6.6%	31.6%	9.6%	0.9%
Habitat Preference Group Composition						
% Clingers	26.9%	11.4%	11.4%	37.4%	10.3%	1.7%
% Sprawlers	53.6%	56.7%	85.8%	8.0%	87.1%	97.4%
% Burrowers	19.4%	31.9%	2.9%	54.6%	2.6%	0.9%

[a] Bold entries excluded from taxa count

Table F.44: Statistical comparison of benthic metrics at Mary Lake littoral stations among years of mine operation (2015, 2016) and baseline (2007) as part of the Mary River Project CREMP. Shading indicates a significant difference for respective comparison (p-value ≤ 0.1).

Metric	Overall 3-group Comparison			Summary Statistics		Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Years?	p-value	Statistical Test [b]	Year	Mean	(I) Year	(J) Year	Significant Difference Between Years?	p-value	Statistical Test
Density	NO	0.8238	α	2007	2,667	2007	2015	NO	0.9863	Tukey's HSD
				2015	2,453	2007	2016	NO	0.8355	
				2016	1,947	2015	2016	NO	0.8980	
Richness	NO	0.6083	η , ζ	2007	8.0	2007	2015	NO	0.8978	Tamhane's
				2015	9.0	2007	2016	NO	0.9205	
				2016	8.7	2015	2016	NO	0.9957	
Simpson's Evenness	NO	0.3927	α	2007	0.718	2007	2015	NO	0.6587	Tamhane's
				2015	0.761	2007	2016	NO	0.6530	
				2016	0.574	2015	2016	NO	0.4705	
Nemata (% of Community)	NO	0.5331	β	2007	7.3%	2007	2015	NO	0.9609	Tukey's HSD
				2015	5.6%	2007	2016	NO	0.7579	
				2016	3.6%	2015	2016	NO	0.5314	
Ostracoda (% of Community)	NO	0.5424	β	2007	0.2%	2007	2015	NO	0.6843	Tukey's HSD
				2015	1.9%	2007	2016	NO	0.5217	
				2016	2.3%	2015	2016	NO	0.9712	
Chironomidae (% of Community)	NO	0.9883	β	2007	90.8%	2007	2015	NO	0.9877	Tukey's HSD
				2015	91.1%	2007	2016	NO	0.9922	
				2016	90.6%	2015	2016	NO	0.9988	
Metal Sensitive Taxa (% of Community)	NO	0.7685	β	2007	22.4%	2007	2015	NO	0.7502	Tukey's HSD
				2015	15.8%	2007	2016	NO	0.9137	
				2016	19.2%	2015	2016	NO	0.9074	
Collector-Gatherer FFG (% of Community)	NO	0.8999	β	2007	66.0%	2007	2015	NO	0.9137	Tukey's HSD
				2015	72.8%	2007	2016	NO	0.9069	
				2016	73.5%	2015	2016	NO	0.9998	
Filterer FFG (% of Commmunity)	NO	0.5744	β	2007	22.0%	2007	2015	NO	0.6010	Tukey's HSD
				2015	14.4%	2007	2016	NO	0.6172	
				2016	12.4%	2015	2016	NO	0.9925	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons

[b] Data analysis included: α - data untransformed, single factor ANOVA test conducted; ζ - single factor ANOVA test validated using Kruskal-Wallis H-test; η - data log transformed, single factor ANOVA test conducted; β - data probit transformed, single factor ANOVA test conducted;

APPENDIX G

FISH POPULATION SURVEY DATA

Table G.1: Electrofishing catch records, Mary River Project CREMP, August 2016. Catch-per-unit-effort (CPUE) represents the number of fish captured per electrofishing minute.

Lake	Sample Station Identifier	Location (NAD83, UTM Zone 17W)				Date	Electrofisher Settings			Effort (seconds)	Fish Species				Total (all species)	
		Start		Finish							Arctic Charr		Nine-spine Stickleback			
		Easting	Northing	Easting	Northing		Output Voltage (volts)	Cycle Freq. (Hz)	Duty Cycle (%)		No. Captured	CPUE	No. Captured	CPUE	No. Captured	CPUE
Reference Lake 3	R316-EF-1	574894	7853037	575170	7853094	14-Aug-16	445	30	12	6,154	36	0.35	5	0.05	41	0.40
	R316-EF-2	574894	7853037	574774	7853057	14-Aug-16	445	30	12	2,446	25	0.61	13	0.32	38	0.93
	R316-EF-3	574774	7853057	574560	7853038	15-Aug-16	445	30	12	5,160	40	0.47	10	0.12	50	0.58
									Total	**13,760**	**101**	**0.48**	**28**	**0.16**	**129**	**0.64**
Camp Lake	CL16-EF-1	557800	7914653	557810	7914604	10-Aug-16	600	50	3	942	**98**	**6.24**	**2**	**0.13**	**100**	**6.37**
Sheardown Lake NW	SDNW16-EF-1	560285	7913485	560235	7913484	12-Aug-16	600	50	3	1,210	**106**	**5.26**	**0**	**0.00**	**106**	**5.26**
Sheardown Lake SE	SDSE16-EF-1	560744	7912333	560873	7912223	12-Aug-16	600	50	3	2,430	**109**	**2.69**	**19**	**0.47**	**128**	**3.16**
Mary Lake	ML16-EF-1	555443	7905149	555509	7904995	14-Aug-16	400	30	12	4,711	**107**	**1.36**	**1**	**0.01**	**108**	**1.38**

Table G.2: Gill netting catch records for Reference Lake 3, Mary River Project CREMP, August 2016. Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Gill Net Set ID	Net Mesh	Location (NAD83, UTM Zone 17W)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Hours	Effort (m*hrs/100 m)	Arctic Charr Catch per Mesh Size			Total Catch	CPUE
		Easting	Northing								1½"	2"	3"		
REF316-GN-1	1½", 2", 3"	0574968	7852932	91	14-Aug-16	14-Aug-16	11:51	13:56	2.08	1.90	0	0	0	0	0.00
					14-Aug-16	14-Aug-16	14:20	15:56	1.60	1.46	0	0	0	0	0.00
REF316-GN-2	1½", 2", 3"	0576157	7852461	91	14-Aug-16	14-Aug-16	12:05	14:35	2.50	2.29	0	1	0	1	0.44
					14-Aug-16	14-Aug-16	14:40	16:17	1.62	1.48	0	0	0	0	0.00
					14-Aug-16	14-Aug-16	16:27	17:46	1.32	1.20	0	0	0	0	0.00
REF316-GN-3	1½", 2", 3"	0575883	7852569	91	14-Aug-16	14-Aug-16	12:16	14:45	2.48	2.27	0	0	0	0	0.00
					14-Aug-16	14-Aug-16	14:47	16:29	1.70	1.55	0	0	0	0	0.00
					14-Aug-16	14-Aug-16	16:40	17:55	1.25	1.14	0	0	0	0	0.00
REF316-GN-4	1½", 2", 3"	0575556	7852583	91	14-Aug-16	14-Aug-16	12:38	14:51	2.22	2.03	0	0	0	0	0.00
					14-Aug-16	14-Aug-16	14:53	16:45	1.87	1.71	0	0	0	0	0.00
REF316-GN-5	1½", 2", 3"	0574297	7852528	91	14-Aug-16	14-Aug-16	12:54	14:54	2.00	1.83	0	1	0	1	0.55
					14-Aug-16	14-Aug-16	15:00	17:00	2.00	1.83	0	0	0	0	0.00
					14-Aug-16	14-Aug-16	17:04	18:08	1.07	0.98	0	0	0	0	0.00
REF316-GN-6	1½", 2", 3"	0574043	7852885	91	14-Aug-16	14-Aug-16	13:10	15:13	2.05	1.87	0	0	1	1	0.53
					14-Aug-16	14-Aug-16	15:21	17:09	1.80	1.65	0	0	0	0	0.00
REF316-GN-7	1½", 2", 3"	0573689	7853524	91	14-Aug-16	14-Aug-16	13:20	15:30	2.17	1.98	0	1	0	1	0.50
					14-Aug-16	14-Aug-16	15:44	17:21	1.62	1.48	0	0	0	0	0.00
REF316-GN-8	1½", 2", 3"	0575562	7852825	91	14-Aug-16	14-Aug-16	16:12	17:37	1.42	1.30	0	0	0	0	0.00
REF316-GN-9	1½", 2", 3"	0575203	7853013	91	15-Aug-16	15-Aug-16	10:50	15:40	4.83	4.42	0	0	1	1	0.23
REF316-GN-10	1½", 2", 3"	0575551	7852907	91	15-Aug-16	15-Aug-16	11:00	16:00	5.00	4.57	0	0	0	0	0.00
REF316-GN-11	1½", 2", 3"	0576077	7852519	91	15-Aug-16	15-Aug-16	11:15	16:15	5.00	4.57	0	0	0	0	0.00
REF316-GN-12	1½", 2", 3"	0574389	7852268	91	15-Aug-16	15-Aug-16	11:30	16:35	5.08	4.65	0	1	0	1	0.22
REF316-GN-13	1½", 2", 3"	0573836	7852703	91	15-Aug-16	15-Aug-16	11:45	17:00	5.25	4.80	0	0	0	0	0.00
REF316-GN-14	1½", 2", 3"	0574043	7854041	91	15-Aug-16	15-Aug-16	11:55	17:15	5.33	4.88	1	2	0	3	0.62
REF316-GN-15	1½", 2", 3"	0573615	7853819	91	15-Aug-16	15-Aug-16	12:00	17:40	5.67	5.18	0	0	5	5	0.96
REF316-GN-16	1½", 2", 3"	0575215	7853056	91	15-Aug-16	15-Aug-16	16:30	18:15	1.75	1.60	0	0	0	0	0.00
REF316-GN-17	1½", 2", 3"	0573897	7852975	91	15-Aug-16	15-Aug-16	17:15	18:00	0.75	0.69	0	0	0	0	0.00
									Total	**65.30**	**1**	**6**	**7**	**14**	**0.15**

Table G.3: Gill netting catch records for Camp Lake, Mary River Project CREMP, August 2016. Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Gill Net Set ID	Net Mesh	Location (NAD83, UTM Zone 17W)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Hours	Effort (m*hrs/100 m)	Arctic Charr Catch per Mesh Size			Total Catch	CPUE
		Easting	Northing								1½"	2"	3"		
CL16-GN-1	1½", 3"	0557751	7914760	60.96	11-Aug-16	11-Aug-16	8:10	9:10	1.00	0.61	1	-	4	5	8.2
					11-Aug-16	11-Aug-16	9:20	12:05	2.75	1.68	0	-	1	1	0.60
CL16-GN-2	1½", 2", 3"	0557745	7914625	91.44	11-Aug-16	11-Aug-16	8:20	9:45	1.42	1.30	1	1	3	5	3.86
					11-Aug-16	11-Aug-16	9:55	12:25	2.50	2.29	0	1	2	3	1.31
					12-Aug-16	12-Aug-16	8:10	10:15	2.08	1.90	0	0	1	1	0.52
CL16-GN-3	1½", 2", 3"	0557630	7914315	91.44	11-Aug-16	11-Aug-16	8:35	10:05	1.50	1.37	0	5	2	7	5.1
					11-Aug-16	11-Aug-16	10:25	12:55	2.50	2.29	2	5	1	8	3.50
					12-Aug-16	12-Aug-16	7:55	9:30	1.58	1.45	2	2	1	5	3.45
CL16-GN-4	1½", 2", 3"	0557632	7914464	91.44	11-Aug-16	11-Aug-16	8:45	10:45	2.00	1.83	2	1	2	5	2.73
					11-Aug-16	11-Aug-16	11:00	13:30	2.50	2.29	2	5	5	12	5.2
					11-Aug-16	11-Aug-16	13:50	15:45	1.92	1.75	2	1	4	7	3.99
					12-Aug-16	12-Aug-16	8:05	9:55	1.83	1.68	2	0	1	3	1.79
CL16-GN-5	1½", 2", 3"	0557284	7914847	91.44	11-Aug-16	11-Aug-16	9:00	11:20	2.33	2.13	0	4	2	6	2.81
					11-Aug-16	11-Aug-16	11:35	13:50	2.25	2.06	0	2	1	3	1.46
					12-Aug-16	12-Aug-16	8:15	10:30	2.25	2.06	0	1	0	1	0.49
CL16-GN-6	1½", 3"	0557557	7914793	60.96	10-Aug-16	10-Aug-16	12:50	14:40	1.83	1.12	1	-	4	5	4.47
CL16-GN-7	1½", 2", 3"	0557461	7914841	91.44	11-Aug-16	11-Aug-16	12:55	15:05	2.17	1.98	1	1	2	4	2.02
					12-Aug-16	12-Aug-16	8:20	10:45	2.42	2.21	2	1	1	4	1.81
CL16-GN-8	1½", 2", 3"	0557717	7914236	91.44	11-Aug-16	11-Aug-16	14:00	16:05	2.08	1.90	0	3	0	3	1.57
									Total	**33.9**	**18**	**33**	**37**	**88**	**2.89**

Table G.4: Gill netting catch records for Sheardown Lake NW, Mary River Project CREMP, August 2016. Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Gill Net Set ID	Net Mesh	Location (NAD83, UTM Zone 17W)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Hours	Effort (m*hrs/100 m)	Arctic Charr Catch per Mesh Size			Total Catch	CPUE
		Easting	Northing								1½"	2"	3"		
SDNW16-GN-1	1½", 2", 3"	0560540	7913231	91	11-Aug-16	11-Aug-16	8:40	10:45	2.08	1.90	0	2	0	2	1.05
					11-Aug-16	11-Aug-16	11:20	15:39	4.32	3.95	0	0	2	2	0.51
					12-Aug-16	12-Aug-16	9:29	12:32	3.05	2.79	1	2	1	4	1.43
					12-Aug-16	12-Aug-16	12:41	15:26	2.75	2.51	1	3	2	6	2.39
SDNW16-GN-2	1½", 2", 3"	0560681	7913119	91	11-Aug-16	11-Aug-16	9:00	11:35	2.58	2.36	3	1	1	5	2.12
					11-Aug-16	11-Aug-16	11:58	15:45	3.78	3.46	0	0	2	2	0.58
SDNW16-GN-3	1½", 2", 3"	0559788	7913351	91	11-Aug-16	11-Aug-16	9:20	12:20	3.00	2.74	0	2	0	2	0.73
SDNW16-GN-4	1½", 2", 3"	0559853	7913527	91	11-Aug-16	11-Aug-16	9:40	12:50	3.17	2.90	3	5	2	10	3.45
					11-Aug-16	11-Aug-16	13:53	16:50	2.95	2.70	2	2	1	5	1.85
					11-Aug-16	11-Aug-16	17:07	18:16	1.15	1.05	1	0	1	2	1.90
					12-Aug-16	12-Aug-16	9:53	13:45	3.87	3.54	2	2	1	5	1.41
					12-Aug-16	12-Aug-16	13:51	16:51	3.00	2.74	0	0	1	1	0.36
SDNW16-GN-5	1½", 2", 3"	0559997	7913418	91	11-Aug-16	11-Aug-16	10:00	14:43	4.72	4.31	1	1	2	4	0.93
					12-Aug-16	12-Aug-16	14:22	17:07	2.75	2.51	1	1	0	2	0.80
SDNW16-GN-6	1½", 2", 3"	0559967	7913485	91	11-Aug-16	11-Aug-16	10:20	13:55	3.58	3.28	4	2	2	8	2.44
					11-Aug-16	11-Aug-16	15:23	17:31	2.13	1.95	2	0	3	5	2.56
					11-Aug-16	11-Aug-16	17:53	18:36	0.72	0.66	0	0	0	0	0.00
					12-Aug-16	12-Aug-16	10:03	14:39	4.60	4.21	1	4	1	6	1.43
					12-Aug-16	12-Aug-16	17:32	18:30	0.97	0.88	0	1	0	1	1.13
SDNW16-GN-7	1½", 2", 3"	0559752	7913552	91	11-Aug-16	11-Aug-16	12:30	16:24	3.90	3.57	3	1	0	4	1.12
					12-Aug-16	12-Aug-16	9:48	13:00	3.20	2.93	1	2	0	3	1.03
					12-Aug-16	12-Aug-16	13:10	16:10	3.00	2.74	1	2	1	4	1.46
					12-Aug-16	12-Aug-16	17:37	18:14	0.62	0.56	3	0	0	3	5.32
SDNW16-GN-8	1½", 2", 3"	0560444	7913294	91	12-Aug-16	12-Aug-16	9:20	10:50	1.50	1.37	0	4	3	7	5.10
									Total	**61.62**	**30**	**37**	**26**	**93**	**1.71**

Table G.5: Gill netting catch records for Sheardown Lake SE, Mary River Project CREMP, August 2016. Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Gill Net Set ID	Net Mesh	Location (NAD83, UTM Zone 17W)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Hours	Effort (m*hrs/100 m)	Arctic Charr Catch per Mesh Size			Total Catch	CPUE
		Easting	Northing								1½"	2"	3"		
SDSE16-GN-1	1½", 2", 3"	0560781	7912251	91	13-Aug-16	13-Aug-16	9:30	10:48	1.30	1.19	5	8	2	15	12.62
SDSE16-GN-2	1½", 2", 3"	0560874	7912095	91	13-Aug-16	13-Aug-16	9:41	11:16	1.58	1.45	5	5	7	17	11.74
SDSE16-GN-3	1½", 2", 3"	0561034	7911947	91	13-Aug-16	13-Aug-16	9:51	12:51	3.00	2.74	6	3	6	15	5.47
SDSE16-GN-4	1½", 2", 3"	0561294	7911852	91	13-Aug-16	13-Aug-16	10:05	13:19	3.23	2.96	2	6	9	17	5.75
SDSE16-GN-5	1½", 2", 3"	0561425	7911888	91	13-Aug-16	13-Aug-16	10:23	14:48	4.42	4.04	2	9	8	19	4.70
									Total	**12.37**	**20**	**31**	**32**	**83**	**8.06**

Table G.6: Gill netting catch records for Mary Lake, Mary River Project CREMP, August 2016. Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Gill Net Set ID	Net Mesh	Location (NAD83, UTM Zone 17W)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Hours	Effort (m*hrs/100 m)	Arctic Charr Catch per Mesh Size			Total Catch	CPUE
		Easting	Northing								1½"	2"	3"		
ML16-GN-1	1½", 2", 3"	0556169	7903786	91.44	13-Aug-16	13-Aug-16	9:45	11:20	1.58	1.45	1	8	6	15	10.36
	1½", 2", 3"	0556169	7903786	91.44	13-Aug-16	13-Aug-16	11:45	14:45	3.00	2.74	2	8	4	14	5.10
ML16-GN-2	1½", 2", 3"	0555906	7903971	91.44	13-Aug-16	13-Aug-16	9:55	11:50	1.92	1.75	2	6	7	15	8.56
ML16-GN-3	1½", 2", 3"	0555125	7905782	91.44	13-Aug-16	13-Aug-16	10:10	13:00	2.83	2.59	1	0	7	8	3.09
					13-Aug-16	13-Aug-16	17:20	18:10	0.83	0.76	0	2	3	5	6.56
ML16-GN-4	1½", 2", 3"	0554816	7906071	91.44	13-Aug-16	13-Aug-16	10:15	13:30	3.25	2.97	7	5	3	15	5.05
					13-Aug-16	13-Aug-16	13:50	15:45	1.92	1.75	3	4	0	7	3.99
ML16-GN-5	1½", 2", 3"	0554871	7906046	91.44	13-Aug-16	13-Aug-16	10:35	14:10	3.58	3.28	2	6	0	8	2.44
ML16-GN-6	1½", 2", 3"	0555995	7903812	91.44	13-Aug-16	13-Aug-16	14:50	16:40	1.83	1.68	0	3	3	6	3.58
ML16-GN-7	1½", 2", 3"	0555251	7905387	91.44	13-Aug-16	13-Aug-16	16:15	17:15	1.00	0.91	2	2	0	4	4.37
									Total	**19.89**	**20**	**44**	**33**	**97**	**5.31**

Table G.7: Summary of Arctic charr gill net catches by mesh size, Mary River Project CREMP, August 2016.

Waterbody	Effort (m*hrs/100 m)	Arctic Charr Catch per Mesh Size			Total Catch	CPUE[a]	Mortalities
		1½"	2"	3"			
Reference Lake 3	65.30	1	6	7	14	0.15	5
Camp Lake	33.88	18	33	37	88	2.89	24
Sheardown Lake NW	61.62	30	37	26	93	1.71	15
Sheardown Lake SE	12.37	20	31	32	83	8.06	25
Mary Lake	19.89	20	44	33	97	5.31	27
Total	**193.07**	**89**	**151**	**135**	**375**	**3.62**	**96**

[a] Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Table G.8: Arctic charr measurements from fish captured at Reference Lake 3 by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Liver Weight (g)	Age (years)	Fulton's Condition Factor (K)
REF316-ACJ-1	5.9	6.3	1.804	0.030	1	0.878
REF316-ACJ-2	7.0	7.6	3.219	0.054	2	0.938
REF316-ACJ-3	7.8	8.5	4.377	0.076	2	0.922
REF316-ACJ-4	11.5	12.4	15.167	0.110	5	0.997
REF316-ACJ-5	3.9	4.1	0.547	0.008	0	0.922
REF316-ACJ-6	3.2	3.3	0.388	0.004	0	1.184
REF316-ACJ-7	5.4	5.7	1.491	0.011	1	0.947
REF316-ACJ-8	5.1	5.4	1.026	0.022	0	0.773
REF316-ACJ-9	8.8	9.4	6.221	0.073	3	0.913
REF316-ACJ-10	3.3	3.4	0.317	0.004	0	0.882
REF316-ACJ-11	5.7	6.1	1.608	-	-	0.868
REF316-ACJ-12	6.2	6.6	2.072	-	-	0.869
REF316-ACJ-13	14.5	15.7	25.212	-	-	0.827
REF316-ACJ-14	10.0	10.8	10.188	-	-	1.019
REF316-ACJ-15	11.4	12.3	12.304	-	-	0.830
REF316-ACJ-16	9.7	10.5	9.344	-	-	1.024
REF316-ACJ-17	13.2	14.2	24.087	-	-	1.047
REF316-ACJ-18	7.3	7.8	3.684	-	-	0.947
REF316-ACJ-19	6.6	7.0	2.420	-	-	0.842
REF316-ACJ-20	6.2	6.6	2.251	-	-	0.944
REF316-ACJ-21	6.0	6.4	1.682	-	-	0.779
REF316-ACJ-22	17.0	18.4	49.518	-	-	1.008
REF316-ACJ-23	7.8	8.4	5.606	-	-	1.181
REF316-ACJ-24	8.9	9.1	6.390	-	-	0.906
REF316-ACJ-25	10.0	11.0	9.212	-	-	0.921
REF316-ACJ-26	7.7	8.4	4.671	-	-	1.023
REF316-ACJ-27	7.1	7.6	2.950	-	-	0.824
REF316-ACJ-28	7.2	7.7	3.071	-	-	0.823
REF316-ACJ-29	7.9	8.4	4.359	-	-	0.884
REF316-ACJ-30	7.6	8.1	4.211	-	-	0.959
REF316-ACJ-31	9.7	10.4	7.606	-	-	0.833
REF316-ACJ-32	10.4	11.3	9.972	-	-	0.887
REF316-ACJ-33	6.1	6.6	1.885	-	-	0.830
REF316-ACJ-34	6.0	6.3	1.783	-	-	0.825
REF316-ACJ-35	3.8	3.9	0.419	-	-	0.764
REF316-ACJ-36	5.0	5.3	1.066	-	-	0.853
REF316-ACJ-37	3.5	3.7	0.315	-	-	0.735
REF316-ACJ-38	3.4	3.5	0.266	-	-	0.677
REF316-ACJ-39	3.8	3.9	0.387	-	-	0.705
REF316-ACJ-40	7.4	7.9	3.535	-	-	0.872
REF316-ACJ-41	5.6	5.9	1.457	-	-	0.830
REF316-ACJ-42	7.5	8.0	3.580	-	-	0.849
REF316-ACJ-43	8.0	8.6	4.242	-	-	0.829
REF316-ACJ-44	8.2	8.8	4.940	-	-	0.896
REF316-ACJ-45	6.7	7.1	3.069	-	-	1.020
REF316-ACJ-46	8.0	8.6	4.517	-	-	0.882
REF316-ACJ-47	3.2	3.3	0.271	-	-	0.827
REF316-ACJ-48	6.9	7.4	3.087	-	-	0.940
REF316-ACJ-49	7.1	7.6	3.381	-	-	0.945
REF316-ACJ-50	6.3	6.7	2.030	-	-	0.812
REF316-ACJ-51	5.7	6.0	1.696	-	-	0.916
REF316-ACJ-52	8.7	9.3	5.983	-	-	0.909
REF316-ACJ-53	6.7	7.1	2.550	-	-	0.848
REF316-ACJ-54	5.2	5.5	1.307	-	-	0.930
REF316-ACJ-55	4.0	4.3	0.596	-	-	0.931
REF316-ACJ-56	4.1	4.2	0.593	-	-	0.860
REF316-ACJ-57	4.2	4.3	0.576	-	-	0.777
REF316-ACJ-58	6.9	7.3	2.001	-	-	0.609
REF316-ACJ-59	4.1	4.3	0.598	-	-	0.868
REF316-ACJ-60	3.9	4.0	0.501	-	-	0.845
REF316-ACJ-61	4.1	4.2	0.588	-	-	0.853
REF316-ACJ-62	6.2	6.5	2.135	-	-	0.896

Table G.8: Arctic charr measurements from fish captured at Reference Lake 3 by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Liver Weight (g)	Age (years)	Fulton's Condition Factor (K)
REF316-ACJ-63		7.8	8.1	3.395	-	-	0.715
REF316-ACJ-64		5.2	5.6	1.137	-	-	0.809
REF316-ACJ-65		6.6	7.0	2.245	-	-	0.781
REF316-ACJ-66		5.0	5.2	0.995	-	-	0.796
REF316-ACJ-67		7.0	7.3	2.506	-	-	0.731
REF316-ACJ-68		4.1	4.2	0.381	-	-	0.553
REF316-ACJ-69		6.1	6.3	1.776	-	-	0.782
REF316-ACJ-70		7.3	7.8	3.246	-	-	0.834
REF316-ACJ-71		4.3	4.6	0.653	-	-	0.821
REF316-ACJ-72		3.3	3.5	0.379	-	-	1.055
REF316-ACJ-73		4.0	4.2	0.507	-	-	0.792
REF316-ACJ-74		6.3	6.8	2.191	-	-	0.876
REF316-ACJ-75		4.0	4.2	0.776	-	-	1.213
REF316-ACJ-76		3.8	3.9	0.367	-	-	0.669
REF316-ACJ-77		9.0	9.6	6.207	-	-	0.851
REF316-ACJ-78		7.7	8.1	3.707	-	-	0.812
REF316-ACJ-79		15.3	16.6	31.755	-	-	0.887
REF316-ACJ-80		6.0	6.4	1.756	-	-	0.813
REF316-ACJ-81		9.2	9.9	5.990	-	-	0.769
REF316-ACJ-82		15.0	16.1	25.471	-	-	0.755
REF316-ACJ-83		7.8	8.3	4.503	-	-	0.949
REF316-ACJ-84		3.8	4.0	0.393	-	-	0.716
REF316-ACJ-85		4.1	4.2	0.462	-	-	0.670
REF316-ACJ-86		3.5	3.6	0.369	-	-	0.861
REF316-ACJ-87		6.0	6.3	1.670	-	-	0.773
REF316-ACJ-88		5.7	5.9	1.317	-	-	0.711
REF316-ACJ-89		7.3	7.9	3.306	-	-	0.850
REF316-ACJ-90		7.1	7.6	3.210	-	-	0.897
REF316-ACJ-91		5.9	6.3	1.572	-	-	0.765
REF316-ACJ-92		7.5	8.1	3.680	-	-	0.872
REF316-ACJ-93		3.8	3.9	0.355	-	-	0.647
REF316-ACJ-94		9.6	10.4	7.873	-	-	0.890
REF316-ACJ-95		3.9	4.1	0.528	-	-	0.890
REF316-ACJ-96		6.1	6.4	2.050	-	-	0.903
REF316-ACJ-97		3.8	4.0	0.460	-	-	0.838
REF316-ACJ-98		4.2	4.4	0.601	-	-	0.811
REF316-ACJ-99*		9.9	10.6	9.201	-	-	0.948
REF316-ACJ-100		3.9	4.0	0.516	-	-	0.870
Overall Catch Summary	total number	100	100	100	10	10	100
	average	6.7	7.1	4.338	0.039	1.4	0.861
	median	6.3	6.7	2.104	0.026	1	0.857
	standard deviation	2.8	3.1	7.148	0.037	1.6	0.110
	standard error	0.3	0.3	0.715	0.012	0.5	0.011
	minimum	3.2	3.3	0.266	0.004	0	0.553
	maximum	17.0	18.4	49.518	0.110	5	1.213
Young-of-the-Year Catch Summary	proportion of YOY	**31%**					
	total number	31	31	31	4	4	31
	average	3.9	4.1	0.522	0.010	0	0.828
	median	3.9	4.1	0.501	0.006	0	0.827
	standard deviation	0.5	0.5	0.207	0.009	0.0	0.140
	standard error	0.1	0.1	0.037	0.004	0.0	0.025
	minimum	3.2	3.3	0.266	0.004	0	0.553
	maximum	5.1	5.4	1.066	0.022	0	1.213

* Initial screening indicated sample was an outlier, and therefore the sample was removed from all subsequent statistical analysis data sets.

Table G.9: Arctic charr measurements from fish captured at Reference Lake 3 by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
REF316-AC-01	2	34.5	37.5	370	17	0.901
REF316-AC-02	2	33.6	36.3	320	21	0.844
REF316-AC-03	3	33.4	36.2	410	-	1.100
REF316-AC-04	2	31.8	34.1	300	-	0.933
REF316-AC-05	3	32.8	35.7	295	-	0.836
REF316-AC-06	2	35.0	38.0	375	-	0.875
REF316-AC-07	3	33.2	36.2	335	-	0.915
REF316-AC-08	3	49.6	52.8	1,100	-	0.901
REF316-AC-09	3	60.0	64.5	1,930	-	0.894
REF316-AC-10	3	55.5	59.4	1,430	-	0.836
REF316-AC-11	3	51.9	56.0	1,540	17	1.102
REF316-AC-12	1.5	21.1	23.2	77	-	0.820
REF316-AC-13	2	32.8	35.3	315	14	0.893
REF316-AC-14	2	35.0	37.6	340	19	0.793
Overall Catch Summary	total number	14	14	14	5	14
	average	38.6	41.6	653	17.6	0.903
	median	34.1	36.9	355	17	0.893
	standard deviation	11.0	11.7	585	2.6	0.093
	standard error	3.0	3.1	156	1.2	0.025
	minimum	21.1	23.2	77	14	0.793
	maximum	60.0	64.5	1,930	21	1.102

Table G.10: Arctic charr measurements from fish captured at Camp Lake by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Liver Weight (g)	Age (years)	Fulton's Condition Factor (K)
CL16-ACJ-1	5.7	6.1	1.534	0.045	1	0.828
CL16-ACJ-2	7.1	7.7	2.721	0.070	2	0.760
CL16-ACJ-3	13.5	14.7	19.937	0.206	2	0.810
CL16-ACJ-4	5.8	6.1	1.579	0.024	1	0.809
CL16-ACJ-5	4.2	4.5	0.686	0.071	0	0.926
CL16-ACJ-6	5.0	5.3	1.020	0.013	1	0.816
CL16-ACJ-7	10.1	10.8	7.908	0.133	2	0.768
CL16-ACJ-8	9.0	9.2	6.258	0.083	2	0.858
CL16-ACJ-9	4.2	4.4	0.572	0.011	0	0.772
CL16-ACJ-10	10.9	11.3	8.874	0.110	2	0.685
CL16-ACJ-11	5.8	6.1	1.822	-	-	0.934
CL16-ACJ-12	6.3	6.7	2.314	-	-	0.925
CL16-ACJ-13	5.8	6.0	1.515	-	-	0.776
CL16-ACJ-14	5.8	6.0	1.700	-	-	0.871
CL16-ACJ-15	5.8	6.2	1.484	-	-	0.761
CL16-ACJ-16	6.9	7.2	2.553	-	-	0.777
CL16-ACJ-17	12.0	13.0	14.205	-	-	0.822
CL16-ACJ-18	6.6	7.0	2.476	-	-	0.861
CL16-ACJ-19	10.0	10.7	7.301	-	-	0.730
CL16-ACJ-20	5.2	5.5	1.187	-	-	0.844
CL16-ACJ-21	6.9	7.3	2.869	-	-	0.873
CL16-ACJ-22	5.7	5.9	1.285	-	-	0.694
CL16-ACJ-23	13.3	14.4	21.783	-	-	0.926
CL16-ACJ-24	6.9	7.2	2.599	-	-	0.791
CL16-ACJ-25	8.3	8.9	4.792	-	-	0.838
CL16-ACJ-26	5.0	5.4	1.053	-	-	0.842
CL16-ACJ-27	12.9	14.0	17.755	-	-	0.827
CL16-ACJ-28	5.9	6.2	1.675	-	-	0.816
CL16-ACJ-29	6.0	6.4	1.855	-	-	0.859
CL16-ACJ-30	6.8	7.3	2.929	-	-	0.932
CL16-ACJ-31	5.4	5.7	1.355	-	-	0.861
CL16-ACJ-32	5.7	6.1	1.705	-	-	0.921
CL16-ACJ-33	14.1	15.4	24.696	-	-	0.881
CL16-ACJ-34	17.1	18.5	38.558	-	-	0.771
CL16-ACJ-35	10.5	11.3	11.304	-	-	0.976
CL16-ACJ-36	7.5	7.9	3.707	-	-	0.879
CL16-ACJ-37	6.0	6.5	1.997	-	-	0.925
CL16-ACJ-38	6.2	6.5	1.990	-	-	0.835
CL16-ACJ-39	10.4	11.3	10.564	-	-	0.939
CL16-ACJ-40	16.0	17.0	34.482	-	-	0.842
CL16-ACJ-41	11.5	12.5	11.240	-	-	0.739
CL16-ACJ-42	12.7	14.0	19.246	-	-	0.940
CL16-ACJ-43	6.5	6.8	2.255	-	-	0.821
CL16-ACJ-44	10.2	11.1	8.139	-	-	0.767
CL16-ACJ-45	6.9	7.4	2.638	-	-	0.803
CL16-ACJ-46	5.7	6.1	1.629	-	-	0.880
CL16-ACJ-47	7.5	7.9	3.211	-	-	0.761
CL16-ACJ-48	6.4	6.8	2.167	-	-	0.827
CL16-ACJ-49	10.1	10.9	7.576	-	-	0.735
CL16-ACJ-50	11.0	12.0	9.791	-	-	0.736
CL16-ACJ-51	10.3	11.0	8.675	-	-	0.794
CL16-ACJ-52	5.2	5.5	1.099	-	-	0.782
CL16-ACJ-53	10.4	11.2	10.162	-	-	0.903
CL16-ACJ-54	6.4	6.8	2.111	-	-	0.805
CL16-ACJ-55	6.0	6.4	1.889	-	-	0.875
CL16-ACJ-56	10.9	11.7	11.131	-	-	0.860
CL16-ACJ-57	7.5	7.8	3.300	-	-	0.782
CL16-ACJ-58	6.8	7.3	2.678	-	-	0.852
CL16-ACJ-59	5.9	6.2	1.628	-	-	0.793
CL16-ACJ-60	5.8	6.2	1.535	-	-	0.787

Table G.10: Arctic charr measurements from fish captured at Camp Lake by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Liver Weight (g)	Age (years)	Fulton's Condition Factor (K)
CL16-ACJ-61		6.5	6.8	2.409	-	-	0.877
CL16-ACJ-62		7.4	7.9	2.992	-	-	0.738
CL16-ACJ-63		5.5	5.9	1.461	-	-	0.878
CL16-ACJ-64		8.1	8.6	4.332	-	-	0.815
CL16-ACJ-65		10.9	11.4	8.959	-	-	0.692
CL16-ACJ-66		8.6	9.2	4.713	-	-	0.741
CL16-ACJ-67		7.0	7.4	2.770	-	-	0.808
CL16-ACJ-68		8.7	9.4	5.528	-	-	0.839
CL16-ACJ-69		6.3	6.6	2.066	-	-	0.826
CL16-ACJ-70		5.8	6.2	1.724	-	-	0.884
CL16-ACJ-71		5.3	5.6	1.265	-	-	0.850
CL16-ACJ-72		15.4	16.9	33.715	-	-	0.923
CL16-ACJ-73		5.6	5.9	1.411	-	-	0.803
CL16-ACJ-74		5.5	5.7	1.296	-	-	0.779
CL16-ACJ-75		6.0	6.4	1.764	-	-	0.817
CL16-ACJ-76		5.6	5.9	1.508	-	-	0.859
CL16-ACJ-77		15.9	17.1	34.325	-	-	0.854
CL16-ACJ-78		13.5	14.6	19.102	-	-	0.776
CL16-ACJ-79		5.9	6.2	1.592	-	-	0.775
CL16-ACJ-80		8.6	9.1	4.905	-	-	0.771
CL16-ACJ-81		6.2	6.5	2.045	-	-	0.858
CL16-ACJ-82		10.1	10.9	7.111	-	-	0.690
CL16-ACJ-83		5.8	6.2	1.697	-	-	0.870
CL16-ACJ-84		6.8	7.1	2.609	-	-	0.830
CL16-ACJ-85		5.2	5.5	1.204	-	-	0.856
CL16-ACJ-86		6.0	6.5	1.905	-	-	0.882
CL16-ACJ-87		16.2	17.6	36.662	-	-	0.862
CL16-ACJ-88		8.1	8.6	4.053	-	-	0.763
CL16-ACJ-89		6.6	7.0	2.341	-	-	0.814
CL16-ACJ-90		11.4	12.3	10.942	-	-	0.739
CL16-ACJ-91		11.0	11.8	9.943	-	-	0.747
CL16-ACJ-92		5.3	5.7	1.315	-	-	0.883
CL16-ACJ-93		6.3	6.6	2.133	-	-	0.853
CL16-ACJ-94		5.4	5.7	1.326	-	-	0.842
CL16-ACJ-95		4.8	5.2	1.078	-	-	0.975
CL16-ACJ-96		17.4	18.8	42.651	-	-	0.810
CL16-ACJ-97		5.2	5.5	1.295	-	-	0.921
CL16-ACJ-98		8.3	8.8	4.292	-	-	0.751
Overall Catch Summary	total number	98	98	98	10	10	98
	average	8.1	8.7	6.746	0.077	1.3	0.827
	median	6.8	7.2	2.576	0.071	2	0.827
	standard deviation	3.2	3.5	9.249	0.061	0.8	0.065
	standard error	0.3	0.4	0.934	0.019	0.3	0.007
	minimum	4.2	4.4	0.572	0.011	0	0.685
	maximum	17.4	18.8	42.651	0.206	2	0.976
Young-of-the-Year Catch Summary	proportion of YOY	**3%**					
	total number	3	3	3	2	2	3
	average	4.4	4.7	0.8	0.0	0.0	0.891
	median	4.2	4.5	0.7	0.0	0.0	0.926
	standard deviation	0.3	0.4	0.3	0.0	0.0	0.106
	standard error	0.2	0.3	0.2	0.0	0.0	0.061
	minimum	4.2	4.4	0.6	0.0	0.0	0.772
	maximum	4.8	5.2	1.1	0.1	0.0	0.975

Table G.11: Results of health endpoint statistical comparisons for nearshore (juvenile) Arctic charr captured between mine-exposed Camp Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (p-value)		Power
					Reference		Exposed					
	Parameter	Covariate	Ref	Exp	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	99	98	-	-	-	-	K-S Test	Yes	0.002	-
	Log_{10} Age (years)	none	10	10	-	-	-	-	ANOVA	No	0.675	-
Energy Use (non-YOY)	Log_{10} Body Weight (g)	none	68	95	-	-	-	-	ANOVA	No	0.890	-
	Log_{10} Fork Length (cm)	none	68	95	-	-	-	-	ANOVA	No	0.813	-
	Log_{10} Body Weight (g)	Log_{10} Age (years)[1]	9	10	0.980	0.000	0.730	0.002	ANCOVA	No	0.165	-
	Log_{10} Fork Length (cm)	Log10 Age (years)[1]	9	10	0.978	0.000	0.000	0.001	ANCOVA	Yes	0.045	0.668
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)[2]	68	95	0.985	0.000	0.994	0.000	ANCOVA	Yes	0.000	0.989

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Ref	Exp		Ref	Exp		Increase	Decrease
Survival	Age (years)	none	10	10	Mean	0.9	1.1	-	283.1	-73.9
Energy Use	Body Weight (g)	none	68	95	Mean	3.862	3.782	-	55	-36
	Fork Length (cm)	none	68	95	Mean	7.6	7.7	-	15.7	-13.6
	Body Weight (g)	Age (years)[1]	9	10	Adjusted Mean	1.839	2.544	-	112.8	-53.0
	Fork Length (cm)	Age (years)[1]	9	10	Adjusted Mean	5.8	6.8	17.9	-	-
Energy Storage	Body Weight (g)	Fork Length (cm)[2]	68	95	Adjusted Mean	3.9	3.7	-5.5	-	-

(shaded box) - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Studentized outlier REF316-ACJ-8 removed.

[2] Slopes not equal, however r^2 of both ANCOVA models (interaction = 0.991, parallel slope = 0.991) using all data was above 0.80 and within 0.20.

Table G.12: Results of health endpoint statistical comparisons for nearshore (juvenile) Arctic charr captured at Camp Lake in 2016 and during the mine baseline period, Mary River Project CREMP.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Data Sets (p-value)		Power
	Parameter	Covariate	Baseline	2016	Baseline		2016					
					r	p-value	r	p-value				
Survival	Fork Length Distribution	none	51	98	-	-	-	-	K-S Test	Yes	0.000	-
Energy Use	Log_{10} Body Weight (g)	none	51	98	-	-	-	-	ANOVA	Yes	0.000	1.000
	Log_{10} Fork Length (cm)	none	51	98	-	-	-	-	ANOVA	Yes	0.000	1.000
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)[1]	51	98	0.988	0.000	0.994	0.000	ANCOVA	Yes	0.000	1.000

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Baseline	2016	Statistic	Baseline	2016		Increase	Decrease
Energy Use	Body Weight (g)	none	51	98	Mean	12.303	3.600	-70.7	-	-
	Fork Length (cm)	none	51	98	Mean	11.2	7.6	-32.3	-	-
Energy Storage	Body Weight (g)	Fork Length (cm)[1]	51	98	Adjusted Mean	5.9	5.3	-9.7	-	-

[shaded box] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Slopes not equal, however r^2 of both ANCOVA models (interaction = 0.995, parallel slope = 0.994) using all data was above 0.80 and within 0.20.

Table G.13: Sample sizes required to detect differences in Arctic charr non-lethal population endpoints for nearshore and littoral/profundal populations at Camp Lake compared to Reference Lake 3 or Camp Lake baseline data, as appropriate, with power = 0.90 and alpha = 0.10 using the 2016 data. Highlighted values indicate sample sizes sufficient to meet CES used for EEM studies.

Mine Lake	Endpoint		Model[a]	Minimum Sample Size (Increase[b] / Decrease[c])							
	Parameter	Covariate		i=5%	i=10%	i=20%	i=25%	i=30%	i=40%	i=50%	i=100%
				d=4%	d=9%	d=17%	d=20	d=23%	d=29%	d=33%	d=50%
Nearshore Electrofishing: Camp Lake versus Reference Lake 3	Body Weight	none	ANOVA	9,128	2394	655	438	317	193	134	46
	Fork Length	none	ANOVA	987	260	72	48	35	22	15	6
	Body Weight	Age	ANCOVA	1,741	457	126	84	61	38	26	10
	Fork Length	Age	ANCOVA	200	53	15	11	8	5	4	2
	Body Weight	Fork Length	All - ANCOVA	83	23	7	5	4	3	2	2
	Body Weight	Fork Length	YOY Only ANCOVA	-	-	-	-	-	-	-	-
	Body Weight	Fork Length	Non-YOY Only ANCOVA	43	12	4	3	3	2	2	1
Nearshore Electrofishing: Camp Lake versus Baseline	Body Weight	none	ANOVA	7,288	1,912	523	350	253	155	107	37
	Fork Length	none	ANOVA	845	223	62	42	30	19	13	5
	Body Weight	Fork Length	ANCOVA	37	11	4	3	2	2	2	1
Littoral / Profundal Gill Netting: Camp Lake versus Baseline	Body Weight	none	ANOVA	3,071	806	221	148	107	66	46	16
	Fork Length	none	ANOVA	350	93	26	18	13	9	6	3
	Body Weight	Age	ANCOVA	1,928	506	139	93	68	42	29	11
	Fork Length	Age	ANCOVA	197	53	15	11	8	5	4	2
	Body Weight	Fork Length	ANCOVA	103	28	8	6	5	3	3	2

[a] Statistical tests include Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), Mann-Whitney U-Test (MW U-test) and Kolmogorov-Smirnov test (K-S Test).

[b] Increase relative to reference mean using log transformed data

[c] Decrease relative to reference mean using log transformed data

Table G.14: Arctic charr measurements from fish captured at Camp Lake by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
CL16-AC-01	3"	38.2	41.7	480	-	0.861
CL16-AC-02	3"	37.6	40.8	515	-	0.969
CL16-AC-03	3"	37.0	40.5	485	-	0.957
CL16-AC-04	3"	35.4	38.2	455	-	1.026
CL16-AC-05	1½"	41.0	44.3	590	-	0.856
CL16-AC-06	3"	35.5	38.7	440	-	0.983
CL16-AC-07	3"	37.2	40.7	485	-	0.942
CL16-AC-08	3"	35.6	39.0	450	-	0.997
CL16-AC-09	2"	34.5	37.5	415	-	1.011
CL16-AC-10	1½"	37.0	40.2	455	-	0.898
CL16-AC-11	3"	36.0	39.1	525	-	1.125
CL16-AC-12	3"	35.2	38.4	450	-	1.032
CL16-AC-13*	2"	34.7	37.7	400	14	0.957
CL16-AC-14	2"	37.2	40.3	460	-	0.894
CL16-AC-15	2"	32.6	35.2	335	-	0.967
CL16-AC-16	2"	34.4	37.5	410	13	1.007
CL16-AC-17	2"	28.9	31.4	232	-	0.961
CL16-AC-18	3"	39.1	42.2	510	-	0.853
CL16-AC-19	3"	34.9	38.0	440	-	1.035
CL16-AC-20	2"	29.4	31.7	234	-	0.921
CL16-AC-21	1½"	34.0	37.4	370	14	0.941
CL16-AC-22	1½"	35.8	38.7	415	13	0.904
CL16-AC-23	2"	37.5	41.7	495	14	0.939
CL16-AC-24	2"	36.9	39.9	425	18	0.846
CL16-AC-25	2"	35.2	38.6	430	17	0.986
CL16-AC-26	2"	35.9	39.0	420	-	0.908
CL16-AC-27	3"	36.8	40.1	460	-	0.923
CL16-AC-28	3"	38.0	41.1	480	-	0.875
CL16-AC-29	3"	37.9	41.7	520	-	0.955
CL16-AC-30	3"	36.5	39.4	460	-	0.946
CL16-AC-31	3"	35.1	37.9	450	-	1.041
CL16-AC-32	2"	35.1	38.0	425	11	0.983
CL16-AC-33	3"	36.2	39.5	460	-	0.970
CL16-AC-34	2"	39.7	43.5	500	18	0.799
CL16-AC-35	2"	38.2	41.4	435	-	0.780
CL16-AC-36	2"	37.1	40.7	425	-	0.832
CL16-AC-37	2"	34.9	37.9	405	13	0.953
CL16-AC-38	2"	39.4	42.7	525	16	0.858
CL16-AC-39	1½"	36.8	40.1	495	-	0.993
CL16-AC-40	1½"	38.8	42.2	530	-	0.907
CL16-AC-41	3"	37.2	41.2	525	-	1.020
CL16-AC-42	3"	36.2	39.5	425	-	0.896
CL16-AC-43	3"	36.8	40.2	530	-	1.063
CL16-AC-44	3"	36.1	39.1	440	-	0.935
CL16-AC-45	3"	37.6	40.9	435	21	0.818
CL16-AC-46	2"	33.1	36.1	375	9	1.034
CL16-AC-47	2"	36.0	39.2	440	11	0.943
CL16-AC-48	2"	40.4	43.5	600	16	0.910
CL16-AC-49	2"	36.3	39.7	460	-	0.962
CL16-AC-50	2"	35.4	38.6	405	-	0.913
CL16-AC-51	1½"	35.5	38.6	430	16	0.961
CL16-AC-52	1½"	35.0	38.4	420	-	0.980
CL16-AC-53	3"	36.8	39.8	435	-	0.873
CL16-AC-54	2"	34.9	38.0	365	-	0.859
CL16-AC-55	2"	37.0	40.4	480	13	0.948
CL16-AC-56	3"	35.8	39.2	450	-	0.981

Table G.14: Arctic charr measurements from fish captured at Camp Lake by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
CL16-AC-57	3"	36.1	39.3	460	-	0.978
CL16-AC-58	3"	35.7	39.0	445	-	0.978
CL16-AC-59	3"	35.9	38.7	440	-	0.951
CL16-AC-60	1½"	36.2	39.5	390	-	0.822
CL16-AC-61	3"	36.4	39.4	475	-	0.985
CL16-AC-62	3"	37.3	40.6	515	-	0.992
CL16-AC-63	2"	35.6	38.6	425	-	0.942
CL16-AC-64	1½"	37.2	40.4	500	-	0.971
CL16-AC-65	3"	35.7	39.1	390	-	0.857
CL16-AC-66	3"	37.5	42.2	460	-	0.872
CL16-AC-67	3"	36.0	39.2	415	-	0.889
CL16-AC-68	3"	36.7	39.6	455	-	0.920
CL16-AC-69	2"	35.9	39.3	425	14	0.919
CL16-AC-70	1½"	35.5	38.7	430	-	0.961
CL16-AC-71	1½"	37.6	41.1	535	-	1.006
CL16-AC-72	2"	35.6	38.8	415	12	0.920
CL16-AC-73	2"	35.2	38.3	425	18	0.974
CL16-AC-74	2"	35.8	38.9	450	-	0.981
CL16-AC-75	3"	34.3	37.9	395	-	0.979
CL16-AC-76*	2"	41.3	44.7	335	17	0.476
CL16-AC-77	2"	35.7	38.8	435	15	0.956
CL16-AC-78	1½"	34.3	37.6	445	-	1.103
CL16-AC-79	1½"	39.8	43.2	465	-	0.738
CL16-AC-80	3"	36.4	39.5	465	-	0.964
CL16-AC-81	1½"	34.5	37.4	460	-	1.120
CL16-AC-82	1½"	35.8	39.1	460	-	1.003
CL16-AC-83	3"	56.5	61.5	1,690	17	0.937
CL16-AC-84	2"	33.1	36.2	325	13	0.896
CL16-AC-85	3"	37.1	41.0	505	-	0.989
CL16-AC-86	2"	34.7	37.1	380	-	0.909
CL16-AC-87	1½"	18.3	19.9	51.5	-	0.840
CL16-AC-88	1½"	37.3	40.8	510	-	0.983
Overall Catch Summary	total number	88	88	88	24	88
	average	36.2	39.5	455	14.7	0.938
	median	36.1	39.3	448	14	0.952
	standard deviation	3.5	3.8	152	2.8	0.086
	standard error	0.4	0.4	16	0.6	0.009
	minimum	18.3	19.9	52	9	0.476
	maximum	56.5	61.5	1,690	21	1.125

* Initial screening indicated sample was an outlier, and therefore the sample was removed from all subsequent statistical analysis data sets.

Table G.15: Additional meristics collected from adult Arctic charr incidental mortalities at Camp Lake in 2016, Mary River Project CREMP, August 2016.

Specimen ID		Age (years)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Adjusted Body Weight (g)	Fulton's Condition Factor (K)	Sex	Liver Weight (g)	Liver Somatic Index (LSI)	Gonad Weight (g)	Gonad Somatic Index (GSI)	Gill Net Mesh Size (inches)	Abnormalities[a]
CL16-AC-16		13	34.4	37.5	410	406	1.01	i	4.072	1.00	-	-	2"	ew (A)
CL16-AC-23		14	37.5	41.7	495	491	0.94	i	4.263	0.87	-	-	2"	ew (A)
CL16-AC-24		18	36.9	39.9	425	420	0.85	i	4.752	1.13	-	-	2"	ew (VA)
CL16-AC-25		17	35.2	38.6	430	426	0.99	i	3.902	0.92	-	-	2"	ew (A)
CL16-AC-34		18	39.7	43.5	500	494	0.80	i	5.842	1.18	-	-	2"	ew (A)
CL16-AC-38		16	39.4	42.7	525	519	0.86	i	5.989	1.15	-	-	2"	ew (A)
CL16-AC-45		21	37.6	40.9	435	431	0.82	i	3.884	0.90	-	-	3"	ew (A)
CL16-AC-46		9	33.1	36.1	375	371	1.03	i	4.382	1.18	-	-	2"	none observed
CL16-AC-47		11	36.0	39.2	440	436	0.94	i	4.215	0.97	-	-	2"	ew (VA) + mark on caudal fin
CL16-AC-48		16	40.4	43.5	600	596	0.91	i	4.328	0.73	-	-	2"	ew (A)
CL16-AC-51		16	35.5	38.6	430	426	0.96	i	4.112	0.97	-	-	1½"	ew (VA)
CL16-AC-55		13	37.0	40.4	480	474	0.95	i	6.084	1.28	-	-	2"	ew (VA)
CL16-AC-72		12	35.6	38.8	415	411	0.92	i	3.765	0.92	-	-	2"	ew (A)
CL16-AC-76		17	41.3	44.7	335	331	0.48	i	3.809	1.15	-	-	2"	ew (S), emaciated condition
CL16-AC-77		15	35.7	38.8	435	429	0.96	i	5.780	1.35	-	-	2"	ew (A)
CL16-AC-83		17	56.5	61.5	1,690	1,667	0.94	i	22.71	1.36	-	-	3"	ew (A)
CL16-AC-13		14	34.7	37.7	400	390	0.96	F	5.893	1.51	4.203	1.078	2"	ew (A)
CL16-AC-21		14	34.0	37.4	370	362	0.94	F	5.420	1.50	2.270	0.627	1½"	ew (A)
CL16-AC-22		13	35.8	38.7	415	409	0.90	F	4.468	1.09	1.602	0.392	1½"	ew (S)
CL16-AC-32		11	35.1	38.0	425	415	0.98	F	5.697	1.37	4.067	0.979	2"	ew (A)
CL16-AC-37		13	34.9	37.9	405	398	0.95	F	4.639	1.17	2.315	0.582	2"	ew (C)
CL16-AC-69		14	35.9	39.3	425	415	0.92	F	5.253	1.27	4.609	1.110	2"	ew (A)
CL16-AC-73		18	35.2	38.3	425	416	0.97	F	4.700	1.13	4.595	1.105	2"	ew (A)
CL16-AC-84		13	33.1	36.2	325	318	0.90	F	4.802	1.51	2.643	0.832	2"	ew (C)
Adult Non-Spawner Statistics	Average	15	38.2	41.7	526	521	0.90	-	5.743	1.07	-	-	-	-
	St. deviation	3.0	5.4	5.8	316	312	0.13	-	4.599	0.18	-	-	-	-
	Minimum	9	33.1	36.1	335	331	0.48	-	3.765	0.73	-	-	-	-
	Maximum	21	56.5	61.5	1690	1667	1.03	-	22.71	1.36	-	-	-	-
	Sample Size (N)	16	16	16	16	16	16	16	16	16	-	-	-	-
Females Statistics	Average	14	34.8	37.9	399	390	0.94	-	5.109	1.32	3.29	0.84	-	-
	St. deviation	2.0	0.9	0.9	35	35	0.03	-	0.531	0.18	1.20	0.28	-	-
	Minimum	11	33.1	36.2	325	318	0.90	-	4.468	1.09	1.60	0.39	-	-
	Maximum	18	35.9	39.3	425	416	0.98	-	5.893	1.51	4.61	1.11	-	-
	Sample Size (N)	8	8	8	8	8	8	8	8	8	8	8	-	-

[a] - Abnomalities include encysted worms (ew) in body cavity; letter in paraentheses indicates Scarce (1-5), Common (6-15), Abundant (16-50) and Very Abundant (>50) observation.

Sex - Female (F), Male (M), Indeterminate (i)

Table G.16: Results of health endpoint statistical comparisons for (adult) Arctic charr captured at Camp Lake littoral/profundal areas in 2016 and during the mine baseline period, Mary River Project CREMP.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (p-value)		Power
					Baseline		2016					
	Parameter	Covariate	Baseline	2016	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	63	87	-	-	-	-	K-S Test	Yes	0.000	-
	Log_{10} Age (years)	none	30	24	-	-	-	-	ANOVA	Yes	0.000	1.000
Energy Use	Log_{10} Body Weight (g)	none	63	87	-	-	-	-	ANOVA	No	0.235	-
	Log_{10} Fork Length (cm)	none	63	87	-	-	-	-	ANOVA	No	0.125	-
	Log_{10} Body Weight (g)	Log_{10} Age (years)[1]	29	24	0.605	0.000	0.073	0.202	ANCOVA	Yes	0.008	-
	Log_{10} Fork Length (cm)	Log_{10} Age (years)[1]	30	24	0.689	0.000	0.199	0.029	ANCOVA	Yes	0.010	-
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)	63	87	0.971	0.000	0.940	0.000	ANCOVA	Yes	0.080	0.543

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]		Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Baseline	2016	Statistic	Baseline	2016			Increase	Decrease
Survival	Age (years)	none	30	24	Mean	9.1	14.5	58.0		-	-
Energy Use	Body Weight (g)	none	63	87	Mean	385.4	438.5	-		37.1	-27.1
	Fork Length (cm)	none	63	87	Mean	34.0	36.0	-		11.2	-10.1
	Body Weight (g)	Age (years)[1]	29	24	Predicted Values	1,025.0	509.5	Max overlap	-50.3	-	-
						202.5	368.9	Min overlap	82.2		
	Fork Length (cm)	Age (years)[1]	30	24	Predicted Values	477.6	394.7	Max overlap	-17.4	-	-
						269.2	327.9	Min overlap	21.8		
Energy Storage	Body Weight (g)	Fork Length (cm)	63	87	Adjusted Mean	423.9	409.2	-3.5		-	-

[shaded] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Poor covariate (age) overlap.

Table G.17: Arctic charr measurements from fish captured at Sheardown Lake NW by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
SDNW16-ACJ-01	7.4	7.9	2.95	1	0.728
SDNW16-ACJ-02	6.7	6.7	2.16	1	0.717
SDNW16-ACJ-03	4.0	4.2	0.492	0	0.769
SDNW16-ACJ-04	3.9	4.2	0.564	0	0.951
SDNW16-ACJ-05	5.0	5.3	1.17	0	0.938
SDNW16-ACJ-06	8.1	8.8	4.62	2	0.870
SDNW16-ACJ-07	9.0	9.7	6.58	2	0.903
SDNW16-ACJ-08	11.2	11.9	11.1	2	0.789
SDNW16-ACJ-09	4.0	4.2	0.564	0	0.881
SDNW16-ACJ-10	4.6	4.9	0.796	0	0.818
SDNW16-ACJ-11	7.3	7.8	3.57	-	0.917
SDNW16-ACJ-12	13.2	15.0	24.6	-	1.069
SDNW16-ACJ-13	6.3	6.7	2.10	-	0.839
SDNW16-ACJ-14	6.8	7.4	2.74	-	0.871
SDNW16-ACJ-15	13.3	15.0	23.6	-	1.002
SDNW16-ACJ-16	9.7	10.3	7.13	-	0.781
SDNW16-ACJ-17	6.4	6.8	2.31	-	0.880
SDNW16-ACJ-18	10.5	11.3	9.79	-	0.846
SDNW16-ACJ-19	11.3	12.0	12.3	-	0.856
SDNW16-ACJ-20	8.9	9.4	6.34	-	0.899
SDNW16-ACJ-21	9.1	9.7	7.11	-	0.943
SDNW16-ACJ-22	7.4	8.0	3.67	-	0.906
SDNW16-ACJ-23	9.2	10.1	6.57	-	0.843
SDNW16-ACJ-24	6.8	7.5	2.87	-	0.914
SDNW16-ACJ-25	6.6	6.9	2.26	-	0.784
SDNW16-ACJ-26	6.3	6.7	2.67	-	1.069
SDNW16-ACJ-27	6.9	7.3	2.76	-	0.839
SDNW16-ACJ-28	6.8	7.2	2.70	-	0.858
SDNW16-ACJ-29	8.4	9.1	5.10	-	0.860
SDNW16-ACJ-30	6.2	6.7	2.26	-	0.946
SDNW16-ACJ-31	8.0	8.6	4.51	-	0.880
SDNW16-ACJ-32	7.2	7.6	2.95	-	0.791
SDNW16-ACJ-33	9.2	9.9	6.66	-	0.855
SDNW16-ACJ-34	17.2	18.6	44.3	-	0.871
SDNW16-ACJ-35	11.1	11.9	10.7	-	0.784
SDNW16-ACJ-36	6.4	6.8	2.18	-	0.831
SDNW16-ACJ-37	14.6	15.7	27.6	-	0.888
SDNW16-ACJ-38	17.6	19.1	49.1	-	0.901
SDNW16-ACJ-39	13.8	15.0	26.4	-	1.005
SDNW16-ACJ-40	7.0	7.5	2.70	-	0.787
SDNW16-ACJ-41	9.2	9.8	6.80	-	0.873
SDNW16-ACJ-42	6.6	7.0	2.28	-	0.794
SDNW16-ACJ-43	16.2	17.6	38.0	-	0.895
SDNW16-ACJ-44	9.3	10.1	7.56	-	0.940
SDNW16-ACJ-45	9.9	10.6	7.99	-	0.823
SDNW16-ACJ-46	7.3	7.8	3.41	-	0.877
SDNW16-ACJ-47	8.1	8.7	4.62	-	0.869
SDNW16-ACJ-48	14.1	15.3	25.2	-	0.898
SDNW16-ACJ-49	8.6	9.2	5.00	-	0.786
SDNW16-ACJ-50	9.4	10.3	7.50	-	0.903
SDNW16-ACJ-51	10.4	11.2	10.7	-	0.950
SDNW16-ACJ-52	12.2	13.1	15.4	-	0.848
SDNW16-ACJ-53	8.4	9.2	5.82	-	0.982
SDNW16-ACJ-54	13.4	14.6	24.0	-	0.999
SDNW16-ACJ-55	8.5	9.1	5.29	-	0.861
SDNW16-ACJ-56	7.4	8.0	3.58	-	0.883
SDNW16-ACJ-57	7.3	7.7	3.22	-	0.827
SDNW16-ACJ-58	10.1	10.9	8.70	-	0.845
SDNW16-ACJ-59	9.2	9.9	7.43	-	0.954

Table G.17: Arctic charr measurements from fish captured at Sheardown Lake NW by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
SDNW16-ACJ-60		13.3	14.4	19.7	-	0.839
SDNW16-ACJ-61		6.3	6.6	2.20	-	0.879
SDNW16-ACJ-62		8.7	9.3	5.37	-	0.816
SDNW16-ACJ-63		6.7	7.1	2.58	-	0.856
SDNW16-ACJ-64		7.2	7.7	3.26	-	0.872
SDNW16-ACJ-65		10.4	11.3	10.0	-	0.889
SDNW16-ACJ-66		9.2	9.8	6.64	-	0.852
SDNW16-ACJ-67		6.1	6.5	1.94	-	0.853
SDNW16-ACJ-68		6.9	7.3	3.18	-	0.969
SDNW16-ACJ-69		12.2	13.2	16.6	-	0.913
SDNW16-ACJ-70		18.7	20.3	45.1	-	0.690
SDNW16-ACJ-71		6.7	7.1	2.73	-	0.906
SDNW16-ACJ-72		12.1	13.1	15.0	-	0.847
SDNW16-ACJ-73		4.5	4.8	0.801	-	0.879
SDNW16-ACJ-74		5.8	6.1	1.64	-	0.842
SDNW16-ACJ-75		4.2	4.4	0.600	-	0.810
SDNW16-ACJ-76		11.6	12.5	12.4	-	0.794
SDNW16-ACJ-77		6.8	7.2	2.80	-	0.892
SDNW16-ACJ-78		8.4	9.1	5.02	-	0.846
SDNW16-ACJ-79		6.9	7.4	2.93	-	0.893
SDNW16-ACJ-80		11.4	12.3	11.9	-	0.803
SDNW16-ACJ-81		13.2	14.4	20.3	-	0.882
SDNW16-ACJ-82		11.5	12.5	12.8	-	0.844
SDNW16-ACJ-83		11.3	12.3	12.3	-	0.854
SDNW16-ACJ-84		9.0	9.7	4.80	-	0.659
SDNW16-ACJ-85		6.6	7.1	2.56	-	0.890
SDNW16-ACJ-86		9.6	10.4	8.01	-	0.905
SDNW16-ACJ-87		12.5	13.5	16.4	-	0.840
SDNW16-ACJ-88		10.9	11.8	11.3	-	0.869
SDNW16-ACJ-89		9.6	10.3	6.94	-	0.784
SDNW16-ACJ-90		6.7	7.2	2.65	-	0.882
SDNW16-ACJ-91		4.6	4.9	0.840	-	0.863
SDNW16-ACJ-92		16.7	18.2	47.0	-	1.010
SDNW16-ACJ-93		9.7	10.5	7.84	-	0.859
SDNW16-ACJ-94		4.0	4.2	0.576	-	0.900
SDNW16-ACJ-95		6.3	6.7	2.14	-	0.856
SDNW16-ACJ-96		8.0	8.6	4.68	-	0.915
SDNW16-ACJ-97		5.8	6.2	1.61	-	0.827
SDNW16-ACJ-98		6.9	7.3	2.60	-	0.791
SDNW16-ACJ-99		7.5	8.1	3.97	-	0.941
SDNW16-ACJ-100		6.4	6.7	2.20	-	0.838
Overall Catch Summary	total number	100	100	100	10	100
	average	9	10	8.77	0.8	0.868
	median	8	9	4.90	0.5	0.869
	standard deviation	3	4	10.5	0.9	0.069
	standard error	0	0	1.05	0.3	0.007
	minimum	4	4	0.492	0	0.659
	maximum	19	20	49.1	2	1.069
Young-of-the-Year Catch Summary	proportion of YOY			**9%**		
	total number	9	9	9	5	9
	average	4.3	4.6	0.712	0	0.868
	median	4.2	4.4	0.600	0	0.879
	standard deviation	0.4	0.4	0.214	0.0	0.060
	standard error	0.1	0.1	0.071	0.0	0.020
	minimum	3.9	4.2	0.492	0	0.769
	maximum	5.0	5.3	1.172	0	0.951

Table G.18: Results of health endpoint statistical comparisons for nearshore non-YOY Arctic charr captured between mine-exposed Sheardown Lake NW and Reference Lake 3, Mary River Project CREMP, August 2016.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (p-value)		Power
					Reference		Exposed					
	Parameter	Covariate	Ref	Exp	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	99	100	-	-	-	-	K-S Test	Yes	0.000	-
	Log_{10} Age (years)	none	10	10	-	-	-	-	ANOVA	No	0.477	-
Energy Use (non-YOY)	Log_{10} Body Weight (g)	none	68	91	-	-	-	-	ANOVA	Yes	0.001	0.960
	Log_{10} Fork Length (cm)	none	68	91	-	-	-	-	ANOVA	Yes	0.001	0.969
	Log_{10} Body Weight (g)	Log_{10} Age (years)[1]	9	10	0.980	0.000	0.914	0.000	ANCOVA	Yes	0.001	0.980
	Log_{10} Body Weight (g)	Log10 Age (years)[1]	9	10	0.978	0.000	0.919	0.000	ANCOVA	Yes	0.000	0.999
Energy Storage (non-YOY)	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)	68	91	0.985	0.000	0.992	0.000	ANCOVA	No	0.363	-

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Ref	Exp		Ref	Exp		Increase	Decrease
Survival	Age (years)	none	10	10	Mean	0.9	0.7	-	315.3	-75.9
Energy Use	Body Weight (g)	none	68	91	Mean	3.862	6.197	60.5	-	-
	Fork Length (cm)	none	68	91	Mean	7.6	8.9	17.3	-	-
	Body Weight (g)	Age (years)[1]	9	10	Adjusted Mean	1.839	3.050	65.8	-	-
	Fork Length (cm)	Age (years)[1]	9	10	Adjusted Mean	5.8	7.2	24.2	-	-
Energy Storage	Body Weight (g)	Fork Length (cm)	68	91	Adjusted Mean	5.1	5.0	-	4.4	-4.2

[grey box] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Studentized outlier REF316-ACJ-8 removed.

Table G.19: Results of health endpoint statistical comparisons for nearshore YOY Arctic charr captured between mine-exposed Sheardown Lake NW and Reference Lake 3, Mary River Project CREMP, August 2016.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (p-value)		Power
					Reference		Exposed					
	Parameter	Covariate	Ref	Exp	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	31	9	-	-	-	-	K-S Test	No	0.139	-
Energy Use	Log_{10} Body Weight (g)	none	31	9	-	-	-	-	ANOVA	Yes	0.013	0.820
	Log_{10} Fork Length (cm)	none	31	9	-	-	-	-	ANOVA	Yes	0.032	0.706
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)	31	9	0.799	0.000	0.937	0.000	ANCOVA	No	0.205	-
	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)[1]	18	9	0.705	0.000	0.937	0.000	ANCOVA	No	0.404	-

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Ref	Exp		Ref	Exp		Increase	Decrease
Energy Use	Body Weight (g)	none	31	9	Mean	0.489	0.687	40.4	-	-
	Fork Length (cm)	none	31	9	Mean	3.9	4.3	9.8	-	-
Energy Storage	Body Weight (g)	Fork Length (cm)	31	9	Adjusted Mean	0.5	0.5	-	15.5	-13.4
	Body Weight (g)	Fork Length (cm)[1]	18	9	Adjusted Mean	0.6	0.7	-	18.1	-15.3

[grey box] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Comparison using fish with fork length of 3.9 cm and greater to satisfy statistical assumption of covariate overlap.

Table G.20: Results of health endpoint statistical comparisons for nearshore (juvenile) Arctic charr captured at Sheardown Lake NW in 2016 and during the mine baseline period, Mary River Project CREMP.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Data Sets (p-value)		Power
					Baseline		2016					
	Parameter	Covariate	Baseline	2016	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	253	100	-	-	-	-	K-S Test	Yes	0.048	-
Energy Use	Log_{10} Body Weight (g)	none	253	100	-	-	-	-	ANOVA	Yes	0.019	0.763
	Log_{10} Fork Length (cm)	none	253	100	-	-	-	-	ANOVA	No	0.144	-
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)	253	100	0.981	0.000	0.994	0.000	ANCOVA	Yes	0.000	1.000

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Baseline	2016	Statistic	Baseline	2016		Increase	Decrease
Energy Use	Body Weight (g)	none	253	100	Mean	7.151	5.084	-28.9	-	-
	Fork Length (cm)	none	253	100	Mean	9.0	8.4	-	13.6	-12.0
Energy Storage	Body Weight (g)	Fork Length (cm)	253	100	Adjusted Mean	6.741	5.923	-12.1	-	-

[shaded box] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

Table G.21: Sample sizes required to detect differences in Arctic charr non-lethal population endpoints for nearshore and littoral/profundal populations at Sheardown Lake NW compared to Reference Lake 3 or Sheardown Lake NW baseline data, as appropriate, with power at 0.90 and alpha = 0.10 using the 2016 data. Highlighted values indicate sample sizes sufficient to meet CES used for EEM studies.

Mine Lake	Endpoint		Model[a]	Minimum Sample Size (Increase[b] / Decrease[c])							
	Parameter	Covariate		i=5%	i=10%	i=20%	i=25%	i=30%	i=40%	i=50%	i=100%
				d=4%	d=9%	d=17%	d=20	d=23%	d=29%	d=33%	d=50%
Nearshore Electrofishing: Sheardown Lake NW versus Reference Lake 3	Body Weight	none	ANOVA	9,219	2418	662	442	320	195	135	47
	Fork Length	none	ANOVA	981	258	71	48	35	22	15	6
	Body Weight	Age	ANCOVA	565	149	42	28	21	13	9	4
	Fork Length	Age	ANCOVA	65	18	6	4	3	3	2	1
	Body Weight	Fork Length	All - ANCOVA	82	22	7	5	4	3	2	2
	Body Weight	Fork Length	YOY Only ANCOVA	132	35	11	7	6	4	3	2
	Body Weight	Fork Length	Non-YOY Only ANCOVA	61	17	5	4	3	2	2	1
Nearshore Electrofishing: Sheardown Lake NW versus Baseline	Body Weight	none	ANOVA	10,722	2,812	769	514	372	227	157	54
	Fork Length	none	ANOVA	1,198	315	87	58	43	26	19	7
	Body Weight	Fork Length	ANCOVA	173	46	14	9	7	5	4	2
Littoral / Profundal Gill Netting: Sheardown Lake NW versus Baseline	Body Weight	none	ANOVA	4,687	1230	337	225	163	100	69	24
	Fork Length	none	ANOVA	499	132	37	25	18	12	8	4
	Body Weight	Age	ANCOVA	1,404	369	102	68	50	31	22	8
	Fork Length	Age	ANCOVA	148	40	12	8	6	4	3	2
	Body Weight	Fork Length	ANCOVA	100	27	8	6	5	3	3	2

[a] Statistical tests include Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), Mann-Whitney U-Test (MW U-test) and Kolmogorov-Smirnov test (K-S Test).

[b] Increase relative to reference mean using log transformed data

[c] Decrease relative to reference mean using log transformed data

Table G.22: Arctic charr measurements from fish captured at Sheardown Lake NW by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
SDNW16-AC-01	2"	26.3	28.4	161	-	0.885
SDNW16-AC-02	2"	36.1	38.8	462	16	0.982
SDNW16-AC-03	3"	37.0	40.0	480	-	0.948
SDNW16-AC-04	2"	27.4	29.6	180	-	0.875
SDNW16-AC-05	1½"	35.2	38.6	415	-	0.952
SDNW16-AC-06	1½"	18.0	19.5	52	-	0.892
SDNW16-AC-07	1½"	18.5	20.0	56.5	-	0.892
SDNW16-AC-08	2"	36.0	39.1	400	-	0.857
SDNW16-AC-09	2"	24.4	26.0	132	-	0.909
SDNW16-AC-10	3"	52.8	56.4	1,900	-	1.291
SDNW16-AC-11	2"	34.0	36.6	380	-	0.967
SDNW16-AC-12	3"	35.8	38.6	445	-	0.970
SDNW16-AC-13	2"	35.8	38.4	435	-	0.948
SDNW16-AC-14	2"	34.2	37.7	405	-	1.012
SDNW16-AC-15	2"	39.4	42.8	480	-	0.785
SDNW16-AC-16	2"	37.8	40.9	550	-	1.018
SDNW16-AC-17	1½"	20.2	22.0	80	-	0.971
SDNW16-AC-18	1½"	18.7	20.1	65	-	0.994
SDNW16-AC-19	1½"	19.5	21.0	71	4	0.958
SDNW16-AC-20	1½"	20.9	22.6	80	5	0.876
SDNW16-AC-21	1½"	20.3	21.7	72	-	0.861
SDNW16-AC-22	1½"	21.0	22.6	81	-	0.875
SDNW16-AC-23	1½"	20.5	22.0	88	-	1.021
SDNW16-AC-24	2"	36.8	38.8	410	-	0.823
SDNW16-AC-25	3"	35.5	36.1	340	-	0.760
SDNW16-AC-26	3"	33.4	35.9	380	10	1.020
SDNW16-AC-27	2"	34.6	37.5	360	13	0.869
SDNW16-AC-28	1½"	32.6	34.9	330	-	0.952
SDNW16-AC-29	3"	34.9	37.9	420	-	0.988
SDNW16-AC-30	3"	42.1	45.3	780	-	1.045
SDNW16-AC-31	2"	62.5	66.4	2,000	-	0.819
SDNW16-AC-32	3"	38.2	41.9	545	-	0.978
SDNW16-AC-33	3"	41.3	44.3	710	-	1.008
SDNW16-AC-34	1½"	20.6	22.1	80	-	0.915
SDNW16-AC-35	1½"	20.4	21.9	77	-	0.907
SDNW16-AC-36	1½"	18.4	19.9	61	-	0.979
SDNW16-AC-37	2"	33.0	35.8	365	10	1.016
SDNW16-AC-38	1½"	29.7	32.2	235	-	0.897
SDNW16-AC-39	1½"	23.5	25.2	124	-	0.955
SDNW16-AC-40	2"	37.8	41.2	515	-	0.954
SDNW16-AC-41	2"	48.8	52.1	1,150	-	0.990
SDNW16-AC-42	3"	52.2	56.1	1,900	-	1.336
SDNW16-AC-43	1½"	20.7	22.3	83	-	0.936
SDNW16-AC-44	1½"	19.2	20.6	67	-	0.947
SDNW16-AC-45	3"	34.5	37.9	420	-	1.023
SDNW16-AC-46	3"	35.6	38.1	515	-	1.141
SDNW16-AC-47	3"	50.0	53.5	1,200	-	0.960
SDNW16-AC-48	3"	32.6	35.6	370	-	1.068
SDNW16-AC-49	1½"	37.7	41.5	510	-	0.952
SDNW16-AC-50	3"	36.1	39.9	505	-	1.073
SDNW16-AC-51	3"	35.2	38.2	425	-	0.974
SDNW16-AC-52	2"	28.6	31.1	203	-	0.868
SDNW16-AC-53	3"	42.0	45.2	705	-	0.952
SDNW16-AC-54	2"	31.8	34.2	300	9	0.933
SDNW16-AC-55	2"	32.4	34.5	310	8	0.911
SDNW16-AC-56	2"	34.0	36.9	380	10	0.967

Table G.22: Arctic charr measurements from fish captured at Sheardown Lake NW by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
SDNW16-AC-57	1½"	35.0	38.3	400	-	0.933
SDNW16-AC-58	2"	36.6	39.7	435	-	0.887
SDNW16-AC-59	2"	33.5	36.0	330	10	0.878
SDNW16-AC-60	3"	43.0	46.3	845	-	1.063
SDNW16-AC-61	2"	32.5	35.9	360	-	1.049
SDNW16-AC-62	1½"	52.8	56.3	1,300	-	0.883
SDNW16-AC-63	2"	40.9	43.8	650	10	0.950
SDNW16-AC-64	3"	35.6	38.8	490	-	1.086
SDNW16-AC-65	2"	33.0	35.8	380	-	1.057
SDNW16-AC-66	2"	37.7	41.0	500	-	0.933
SDNW16-AC-67	1½"	18.6	20.0	59	-	0.917
SDNW16-AC-68	1½"	18.8	20.4	66	5	0.993
SDNW16-AC-69	3"	36.8	40.3	480	-	0.963
SDNW16-AC-70	2"	33.4	36.4	365	-	0.980
SDNW16-AC-71	2"	28.3	30.5	220	-	0.971
SDNW16-AC-72	1½"	21.8	23.6	106	-	1.023
SDNW16-AC-73	2"	34.6	38.0	445	15	1.074
SDNW16-AC-74	2"	30.8	33.4	320	13	1.095
SDNW16-AC-75	3"	40.6	44.0	640	-	0.956
SDNW16-AC-76	3"	35.0	37.9	400	-	0.933
SDNW16-AC-77	2"	32.6	36.0	370	-	1.068
SDNW16-AC-78	2"	29.0	31.2	245	-	1.005
SDNW16-AC-79	2"	26.5	28.6	173	-	0.930
SDNW16-AC-80	1½"	19.8	21.1	71	-	0.915
SDNW16-AC-81	3"	35.4	39.2	465	-	1.048
SDNW16-AC-82	2"	34.3	37.5	370	-	0.917
SDNW16-AC-83	2"	35.9	39.3	470	-	1.016
SDNW16-AC-84	1½"	35.0	38.2	390	-	0.910
SDNW16-AC-85	1½"	34.9	37.9	395	-	0.929
SDNW16-AC-86	2"	36.5	39.7	470	-	0.967
SDNW16-AC-87	1½"	20.9	22.1	84	-	0.920
SDNW16-AC-88	1½"	20.6	22.3	78	-	0.892
SDNW16-AC-89	1½"	20.1	21.8	77	-	0.948
SDNW16-AC-90	1½"	22.3	23.9	98	-	0.884
SDNW16-AC-91	2"	35.4	38.0	440	-	0.992
Overall Catch Summary	total number	91	91	91	14	91
	average	32.3	34.9	409	9.9	0.963
	median	34.2	36.9	380	10	0.954
	standard deviation	9.1	9.8	375	3.6	0.088
	standard error	1.0	1.0	39.3	1.0	0.009
	minimum	18.0	19.5	52	4	0.760
	maximum	62.5	66.4	2,000	16	1.336

* Initial screening indicated sample was an outlier, and therefore the sample was removed from all subsequent statistical analysis data sets.

Table G.23: Additional meristics collected from adult Arctic charr incidental mortalities at Sheardown Lake NW in 2016, Mary River Project CREMP, August 2016.

Specimen ID		Age (years)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Adjusted Body Weight (g)	Fulton's Condition Factor (K)	Sex	Liver Weight (g)	Liver Somatic Index (LSI)	Gonad Weight (g)	Gonad Somatic Index (GSI)	Gill Net Mesh Size (inches)	Abnormalities[a]
SDNW16-AC-02		16	36.1	38.8	462	456	0.98	i	5.651	1.22	-	-	2"	ew (VA)
SDNW16-AC-19		4	19.5	21.0	71	70	0.96	i	0.714	1.01	-	-	1½"	none observed
SDNW16-AC-20		5	20.9	22.6	80	79	0.88	i	0.688	0.86	-	-	1½"	none observed
SDNW16-AC-26		10	33.4	35.9	380	376	1.02	i	4.056	1.07	-	-	3"	ew (S)
SDNW16-AC-27		13	34.6	37.5	360	357	0.87	i	3.258	0.91	-	-	2"	ew (C)
SDNW16-AC-37		10	33.0	35.8	365	361	1.02	i	3.655	1.00	-	-	2"	ew (S)
SDNW16-AC-54		9	31.8	34.2	300	298	0.93	i	2.413	0.80	-	-	2"	ew (A)
SDNW16-AC-55		8	32.4	34.5	310	307	0.91	i	2.885	0.93	-	-	2"	ew (A)
SDNW16-AC-56		10	34.0	36.9	380	377	0.97	i	3.332	0.88	-	-	2"	ew (C)
SDNW16-AC-59		10	33.5	36.0	330	327	0.88	i	3.277	0.99	-	-	2"	ew (C)
SDNW16-AC-63		10	40.9	43.8	650	642	0.95	i	7.540	1.16	-	-	2"	ew (S)
SDNW16-AC-68		5	18.8	20.4	66	65	0.99	i	0.680	1.03	-	-	1½"	tape worms (S)
SDNW16-AC-73		15	34.6	38.0	445	442	1.07	i	3.221	0.72	-	-	2"	ew (C)
SDNW16-AC-74		13	30.8	33.4	320	303	1.10	M	2.609	0.82	14.412	4.757	2"	ew (S)
Adult Non-Spawner Statistics	Average	9.6	31.0	33.5	323	320	0.96	-	3.182	0.97	-	-	-	-
	St. deviation	3.6	6.8	7.3	168	166	0.06	-	1.944	0.14	-	-	-	-
	Minimum	4	18.8	20.4	66	65	0.87	-	0.680	0.72	-	-	-	-
	Maximum	16	40.9	43.8	650	642	1.07	-	7.540	1.22	-	-	-	-
	Sample Size (N)	13	13	13	13	13	13	13	13	13	-	-	-	-

[a] - Abnomalities include encysted worms (ew) in body cavity; letter in paraentheses indicates Scarce (1-5), Common (6-15), Abundant (16-50) and Very Abundant (>50) observation.

Sex - Male (M), Indeterminate (i)

Table G.24: Results of health endpoint statistical comparisons for (adult) Arctic charr captured at Sheardown Lake NW littoral/profundal areas in 2016 and during the mine baseline period, Mary River Project CREMP.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Data Sets (p-value)		Power
					Baseline		2016					
	Parameter	Covariate	Baseline	2016	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	118	91	-	-	-	-	K-S Test	Yes	0.001	-
	Log_{10} Age (years)	none	30	14	-	-	-	-	ANOVA	Yes	0.016	0.797
Energy Use	Log_{10} Body Weight (g)	none	118	91	-	-	-	-	ANOVA	Yes	0.001	0.948
	Log_{10} Fork Length (cm)	none	118	91	-	-	-	-	ANOVA	Yes	0.000	0.995
	Log_{10} Body Weight (g)	Log_{10} Age (years)	30	14	0.680	0.000	0.790	0.000	ANCOVA	No	0.153	-
	Log_{10} Fork Length (cm)	Log_{10} Age (years)	30	14	0.717	0.000	0.756	0.000	ANCOVA	No	0.500	-
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)	118	91	0.965	0.000	0.991	0.000	ANCOVA	Yes	0.000	1.000

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Baseline	2016	Statistic	Baseline	2016		Increase	Decrease
Survival	Age (years)	none	30	14	Mean	12.7	9.2	-27.7	-	-
Energy Use	Body Weight (g)	none	118	91	Mean	411.8	284.7	-30.9	-	-
	Fork Length (cm)	none	118	91	Mean	36.2	31.0	-14.5	-	-
	Body Weight (g)	Age (years)	30	14	Adjusted Mean	308.5	377.1	-	50.0	-33.3
	Fork Length (cm)	Age (years)	30	14	Adjusted Mean	330.7	338.2	-	14.0	-12.3
Energy Storage	Body Weight (g)	Fork Length (cm)	118	91	Adjusted Mean	336.1	373.3	11.1	-	-

[grey box] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

Table G.25: Arctic charr measurements from fish captured at Sheardown Lake SE by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
SDSE16-ACJ-01	7.6	8.1	3.853	0	0.878
SDSE16-ACJ-02	11.3	12.1	12.118	2	0.840
SDSE16-ACJ-03*	4.7	4.9	0.556	0	0.536
SDSE16-ACJ-04	4.9	5.2	1.096	0	0.932
SDSE16-ACJ-05	3.9	4.1	0.443	0	0.747
SDSE16-ACJ-06	7.0	7.5	2.897	1	0.845
SDSE16-ACJ-07	9.6	10.1	8.764	2	0.991
SDSE16-ACJ-08	6.2	6.5	1.930	1	0.810
SDSE16-ACJ-09	8.1	8.6	4.192	1	0.789
SDSE16-ACJ-10	5.0	5.2	1.112	0	0.890
SDSE16-ACJ-11	7.9	8.3	4.473	-	0.907
SDSE16-ACJ-12	7.3	7.8	3.083	-	0.793
SDSE16-ACJ-13	7.4	7.9	3.612	-	0.891
SDSE16-ACJ-14	8.4	9.0	5.529	-	0.933
SDSE16-ACJ-15	7.9	8.6	4.682	-	0.950
SDSE16-ACJ-16	4.6	4.9	0.933	-	0.959
SDSE16-ACJ-17	4.7	5.0	0.900	-	0.867
SDSE16-ACJ-18	4.3	4.5	0.692	-	0.870
SDSE16-ACJ-19	4.6	4.9	0.832	-	0.855
SDSE16-ACJ-20	4.4	4.6	0.654	-	0.768
SDSE16-ACJ-21	4.9	5.2	1.074	-	0.913
SDSE16-ACJ-22	4.6	4.8	0.717	-	0.737
SDSE16-ACJ-23	5.1	5.4	1.059	-	0.798
SDSE16-ACJ-24	4.2	4.4	0.689	-	0.930
SDSE16-ACJ-25	8.6	9.1	5.123	-	0.805
SDSE16-ACJ-26	4.0	4.2	0.536	-	0.838
SDSE16-ACJ-27	4.6	4.8	0.963	-	0.989
SDSE16-ACJ-28	8.1	8.5	4.410	-	0.830
SDSE16-ACJ-29	4.8	5.1	0.919	-	0.831
SDSE16-ACJ-30	4.5	4.8	0.831	-	0.912
SDSE16-ACJ-31	4.4	4.6	0.747	-	0.877
SDSE16-ACJ-32	4.3	4.5	0.712	-	0.896
SDSE16-ACJ-33	5.0	5.2	1.110	-	0.888
SDSE16-ACJ-34	4.2	4.4	0.643	-	0.868
SDSE16-ACJ-35	4.2	4.4	0.593	-	0.800
SDSE16-ACJ-36	8.0	8.4	4.859	-	0.949
SDSE16-ACJ-37	7.3	7.8	3.733	-	0.960
SDSE16-ACJ-38	4.5	4.7	0.831	-	0.912
SDSE16-ACJ-39	4.4	4.6	0.734	-	0.862
SDSE16-ACJ-40	4.4	4.6	0.776	-	0.911
SDSE16-ACJ-41	4.0	4.2	0.475	-	0.742
SDSE16-ACJ-42	6.5	7.0	2.414	-	0.879
SDSE16-ACJ-43	4.3	4.5	0.660	-	0.830
SDSE16-ACJ-44	7.3	7.7	3.323	-	0.854
SDSE16-ACJ-45	7.2	7.6	3.026	-	0.811
SDSE16-ACJ-46	6.9	7.4	3.263	-	0.993
SDSE16-ACJ-47	7.2	7.7	3.744	-	1.003
SDSE16-ACJ-48	4.8	4.9	0.959	-	0.867
SDSE16-ACJ-49	7.8	8.3	4.482	-	0.944
SDSE16-ACJ-50	4.7	4.9	1.026	-	0.988
SDSE16-ACJ-51	7.9	8.4	5.024	-	1.019
SDSE16-ACJ-52	7.9	8.5	4.188	-	0.849
SDSE16-ACJ-53	7.8	8.2	4.076	-	0.859
SDSE16-ACJ-54	4.6	4.8	0.770	-	0.791
SDSE16-ACJ-55	7.3	7.8	3.810	-	0.979
SDSE16-ACJ-56	4.5	4.7	0.682	-	0.748
SDSE16-ACJ-57	5.0	5.2	1.184	-	0.947
SDSE16-ACJ-58	7.0	7.4	3.003	-	0.876
SDSE16-ACJ-59	4.5	4.7	0.871	-	0.956

Table G.25: Arctic charr measurements from fish captured at Sheardown Lake SE by electrofishing, Mary River Project CREMP, August 2016.

	Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
	SDSE16-ACJ-60	4.5	4.7	0.792	-	0.869
	SDSE16-ACJ-61	4.0	4.2	0.604	-	0.944
	SDSE16-ACJ-62	4.5	4.7	0.772	-	0.847
	SDSE16-ACJ-63	7.1	7.5	3.292	-	0.920
	SDSE16-ACJ-64	4.4	4.6	0.813	-	0.954
	SDSE16-ACJ-65	4.7	4.9	0.871	-	0.839
	SDSE16-ACJ-66	4.2	4.3	0.631	-	0.852
	SDSE16-ACJ-67	4.4	4.6	0.648	-	0.761
	SDSE16-ACJ-68	4.2	4.4	0.651	-	0.879
	SDSE16-ACJ-69	7.5	8.0	3.677	-	0.872
	SDSE16-ACJ-70	4.7	4.9	0.803	-	0.773
	SDSE16-ACJ-71	4.0	4.2	0.446	-	0.697
	SDSE16-ACJ-72	3.8	4.0	0.409	-	0.745
	SDSE16-ACJ-73	7.8	8.3	4.247	-	0.895
	SDSE16-ACJ-74	4.5	4.7	0.786	-	0.863
	SDSE16-ACJ-75	4.0	4.2	0.574	-	0.897
	SDSE16-ACJ-76	4.7	4.9	0.887	-	0.854
	SDSE16-ACJ-77	5.0	5.3	1.169	-	0.935
	SDSE16-ACJ-78	4.0	4.2	0.432	-	0.675
	SDSE16-ACJ-79	8.3	8.8	5.124	-	0.896
	SDSE16-ACJ-80	4.4	4.6	0.763	-	0.896
	SDSE16-ACJ-81	6.9	7.3	2.885	-	0.878
	SDSE16-ACJ-82	6.5	6.9	2.195	-	0.799
	SDSE16-ACJ-83	5.0	5.3	1.182	-	0.946
	SDSE16-ACJ-84	4.3	4.5	0.602	-	0.757
	SDSE16-ACJ-85	4.5	4.4	0.638	-	0.700
	SDSE16-ACJ-86	4.3	4.5	0.606	-	0.762
	SDSE16-ACJ-87	4.5	4.7	0.810	-	0.889
	SDSE16-ACJ-88	7.5	8.0	3.744	-	0.887
	SDSE16-ACJ-89	4.7	5.0	0.929	-	0.895
	SDSE16-ACJ-90	7.2	7.6	2.874	-	0.770
	SDSE16-ACJ-91	4.0	4.2	0.539	-	0.842
	SDSE16-ACJ-92	4.4	4.6	0.771	-	0.905
	SDSE16-ACJ-93	5.0	5.3	1.198	-	0.958
	SDSE16-ACJ-94	4.9	5.1	1.038	-	0.882
	SDSE16-ACJ-95	4.3	4.5	0.671	-	0.844
	SDSE16-ACJ-96	4.3	4.5	0.693	-	0.872
	SDSE16-ACJ-97	7.4	7.9	3.998	-	0.987
	SDSE16-ACJ-98	4.1	4.2	0.586	-	0.850
	SDSE16-ACJ-99	4.3	4.4	0.668	-	0.840
	SDSE16-ACJ-100	4.3	4.5	0.656	-	0.825
Overall Catch Summary	total number	100	100	100	10	100
	average	5.6	5.9	1.961	0.7	0.864
	median	4.7	4.9	0.924	1	0.871
	standard deviation	1.6	1.8	1.953	1	0.081
	standard error	0.2	0.2	0.195	0.3	0.008
	minimum	3.8	4.0	0.409	0	0.536
	maximum	11.3	12.1	12.118	2	1.019
Young-of-the-Year Catch Summary	proportion of YOY	**64%**				
	total number	64	64	64	4	64
	average	4.5	4.7	0.771	0	0.852
	median	4.5	4.6	0.755	0	0.867
	standard deviation	0.3	0.3	0.200	0.0	0.084
	standard error	0.0	0.0	0.025	0.0	0.011
	minimum	3.8	4.0	0.409	0	0.536
	maximum	5.0	5.3	1.198	0	0.989

* Initial screening indicated sample was an outlier, and therefore the sample was removed from all subsequent statistical analysis data sets.

Table G.26: Results of health endpoint statistical comparisons for nearshore (non-YOY) Arctic charr captured between mine-exposed Sheardown Lake SE and Reference Lake 3, Mary River Project CREMP, August 2016.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (p-value)		Power
					Reference		Exposed					
	Parameter	Covariate	Ref	Exp	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	99	100	-	-	-	-	K-S Test	Yes	0.000	-
	Log_{10} Age (years)	none	10	10	-	-	-	-	ANOVA	No	0.374	0.227
Energy Use (non-YOY)	Log_{10} Body Weight (g)	none	68	35	-	-	-	-	ANOVA	No	0.951	0.101
	Log_{10} Fork Length (cm)	none	68	35	-	-	-	-	ANOVA	No	0.944	0.101
	Log_{10} Body Weight (g)	Log_{10} Age (years)[1]	9	9	0.980	0.000	0.647	0.009	ANCOVA	Yes	0.003	0.960
	Log_{10} Fork Length (cm)	Log10 Age (years)[1]	9	10	0.978	0.000	0.698	0.003	ANCOVA	Yes	0.001	0.994
Energy Storage (non-YOY)	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)	68	35	0.985	0.000	0.951	0.000	ANCOVA	No	0.329	0.256

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Ref	Exp	Statistic	Ref	Exp		Increase	Decrease
Survival	Age (years)	none	10	10	Mean	0.9	0.6	-32.4	297.4	-74.8
Energy Use	Body Weight (g)	none	68	35	Mean	3.862	3.897	-	52	-34
	Fork Length (cm)	none	68	35	Mean	7.6	7.6	-	14.3	-12.5
	Body Weight (g)	Age (years)[1]	9	9	Adjusted Mean	1.839	4.045	120.0	-	-
	Fork Length (cm)	Age (years)[1]	9	10	Adjusted Mean	5.8	7.8	34.1	-	-
Energy Storage	Body Weight (g)	Fork Length (cm)	68	35	Adjusted Mean	3.8	3.9	-	5.7	-5.4

(grey shading) - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Studentized outlier REF316-ACJ-8 removed.

Table G.27: Results of health endpoint statistical comparisons for nearshore YOY Arctic charr captured between mine-exposed Sheardown Lake SE and Reference Lake 3, Mary River Project CREMP, August 2016.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (p-value)		Power
					Reference		Exposed					
	Parameter	Covariate	Ref	Exp	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	31	65	-	-	-	-	K-S Test	Yes	0.000	-
Energy Use	Log_{10} Body Weight (g)	none	31	64	-	-	-	-	ANOVA	Yes	0.000	1.000
	Log_{10} Fork Length (cm)	none	31	65	-	-	-	-	ANOVA	Yes	0.000	1.000
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)[1]	31	64	0.799	0.000	0.905	0.000	ANCOVA	No	0.316	-
	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)[2]	24	64	0.761	0.000	0.905	0.000	ANCOVA	No	0.273	-

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Ref	Exp	Statistic	Ref	Exp		Increase	Decrease
Energy Use	Body Weight (g)	none	31	64	Mean	0.489	0.753	54.0	-	-
	Fork Length (cm)	none	31	65	Mean	3.9	4.5	14.0	-	-
Energy Storage	Body Weight (g)	Fork Length (cm)[1]	31	64	Adjusted Mean	0.6	0.6	4.4	7.6	-7.0
	Body Weight (g)	Fork Length (cm)[2]	24	64	Adjusted Mean	0.7	0.7	4.5	7.0	-6.6

[shaded] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Slopes not equal, however r^2 of both ANCOVA models (interaction = 0.901, parallel slope = 0.893) using all data was above 0.80 and within 0.20.

Table G.28: Results of health endpoint statistical comparisons for nearshore (juvenile) Arctic charr captured at Sheardown Lake SE in 2016 and during the mine baseline period, Mary River Project CREMP.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Data Sets (p-value)		Power
					Baseline		2016					
	Parameter	Covariate	Baseline	2016	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	16	100	-	-	-	-	K-S Test	Yes	0.000	-
Energy Use	Log_{10} Body Weight (g)	none	16	99	-	-	-	-	ANOVA	Yes	0.010	0.832
	Log_{10} Fork Length (cm)	none	16	100	-	-	-	-	ANOVA	Yes	0.020	0.757
Energy Storage	Log_{10} Adj. Body Weight (g)	Log10 Fork Length (cm)[1]	16	99	0.811	0.000	0.990	0.000	ANCOVA	Yes	0.029	0.712
	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)[2]	14	11	0.705	0.000	0.811	0.000	ANCOVA	Yes	0.008	0.878

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Baseline	2016	Statistic	Baseline	2016		Increase	Decrease
Energy Use	Body Weight (g)	none	16	99	Mean	2.371	1.347	-43.2	-	-
	Fork Length (cm)	none	16	100	Mean	6.3	5.4	-14.8	-	-
Energy Storage	Body Weight (g)	Fork Length (cm)[1]	16	99	Adjusted Mean	1.207	1.396	15.7	-	-
	Body Weight (g)	Fork Length (cm)[2]	14	11	Adjusted Mean	2.967	2.487	-16.2	-	-

[grey box] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Poor overlap of covariate values between areas.

[2] Comparison using fish with fork length between 5.7 and 7.3 cm to satisfy statistical assumption of covariate overlap.

Table G.29: Sample sizes required to detect differences in Arctic charr non-lethal population endpoints for nearshore and littoral/profundal populations at Sheardown Lake SE compared to Reference Lake 3 or Sheardown Lake SE baseline data, as appropriate, with power at 0.90 and alpha = 0.10 using the 2016 data. Highlighted values indicate sample sizes sufficient to meet CES used for EEM studies.

Mine Lake	Endpoint		Model[a]	Minimum Sample Size (Increase[b] / Decrease[c])							
	Parameter	Covariate		i=5%	i=10%	i=20%	i=25%	i=30%	i=40%	i=50%	i=100%
				d=4%	d=9%	d=17%	d=20	d=23%	d=29%	d=33%	d=50%
Nearshore Electrofishing: Sheardown Lake SE versus Reference Lake 3	Body Weight	none	ANOVA	-	-	-	-	-	-	-	-
	Fork Length	none	ANOVA	-	-	-	-	-	-	-	-
	Body Weight	Age	ANCOVA	1,713	450	124	83	60	37	26	10
	Fork Length	Age	ANCOVA	167	45	13	9	7	5	4	2
	Body Weight	Fork Length	All - ANCOVA	82	22	7	5	4	3	2	2
	Body Weight	Fork Length	YOY Only ANCOVA	103	28	8	6	5	3	3	2
	Body Weight	Fork Length	Non-YOY Only ANCOVA	66	18	6	4	3	3	2	1
Nearshore Electrofishing: Sheardown Lake SE versus Baseline	Body Weight	none	ANOVA	4,599	1,207	331	221	160	98	68	24
	Fork Length	none	ANOVA	463	122	34	23	17	11	8	3
	Body Weight	Fork Length	ANCOVA	93	25	8	6	4	3	3	2
Littoral / Profundal Gill Netting: Sheardown Lake SE versus Baseline	Body Weight	none	ANOVA	1,265	333	92	62	45	28	20	7
	Fork Length	none	ANOVA	134	36	11	8	6	4	3	2
	Body Weight	Age	ANCOVA	340	90	25	17	13	8	6	3
	Fork Length	Age	ANCOVA	39	11	4	3	2	2	2	1
	Body Weight	Fork Length	ANCOVA	73	20	6	5	4	3	2	2

[a] Statistical tests include Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), Mann-Whitney U-Test (MW U-test) and Kolmogorov-Smirnov test (K-S Test).

[b] Increase relative to reference mean using log transformed data

[c] Decrease relative to reference mean using log transformed data

Table G.30: Arctic charr measurements from fish captured at Sheardown Lake SE by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
SDSE16-AC-01	3"	38.2	41.6	470	14	0.843
SDSE16-AC-02	2"	37.5	40.4	450	-	0.853
SDSE16-AC-03	2"	35.0	38.3	460	-	1.073
SDSE16-AC-04	2"	53.1	56.3	1,200	-	0.801
SDSE16-AC-05	2"	33.2	35.9	380	-	1.038
SDSE16-AC-06	2"	33.3	36.7	365	-	0.988
SDSE16-AC-07	2"	35.1	37.7	485	-	1.122
SDSE16-AC-08	1½"	38.0	40.7	550	-	1.002
SDSE16-AC-09	1½"	39.1	42.3	530	-	0.887
SDSE16-AC-10	1½"	36.2	39.6	430	-	0.906
SDSE16-AC-11	1½"	35.2	38.2	430	-	0.986
SDSE16-AC-12	1½"	35.9	39.2	460	-	0.994
SDSE16-AC-13	3"	34.5	37.7	500	13	1.218
SDSE16-AC-14	2"	34.9	37.6	430	16	1.012
SDSE16-AC-15	2"	32.7	35.2	380	12	1.087
SDSE16-AC-16	3"	38.0	41.2	540	-	0.984
SDSE16-AC-17	1½"	35.2	38.1	415	-	0.952
SDSE16-AC-18	1½"	34.5	38.2	395	-	0.962
SDSE16-AC-19	1½"	36.8	40.1	440	-	0.883
SDSE16-AC-20	1½"	40.4	44.1	665	-	1.009
SDSE16-AC-21	2"	36.1	39.2	470	-	0.999
SDSE16-AC-22	3"	36.4	39.3	530	-	1.099
SDSE16-AC-23	3"	32.9	35.4	385	-	1.081
SDSE16-AC-24	3"	35.3	38.5	430	-	0.978
SDSE16-AC-25	3"	34.0	37.1	405	-	1.030
SDSE16-AC-26	3"	37.7	40.5	530	-	0.989
SDSE16-AC-27	1½"	24.1	25.9	122	-	0.872
SDSE16-AC-28	3"	37.0	40.1	520	-	1.027
SDSE16-AC-29	1½"	24.4	26.3	134	-	0.922
SDSE16-AC-30	3"	38.5	41.2	570	-	0.999
SDSE16-AC-31	3"	40.4	44.1	660	-	1.001
SDSE16-AC-32	1½"	23.5	25.4	120	-	0.925
SDSE16-AC-33	1½"	23.0	25.0	113	-	0.929
SDSE16-AC-34	3"	39.5	42.2	605	-	0.982
SDSE16-AC-35	3"	38.2	41.3	555	-	0.996
SDSE16-AC-36	3"	42.2	45.1	745	-	0.991
SDSE16-AC-37	3"	39.1	42.2	570	-	0.954
SDSE16-AC-38	3"	38.5	41.5	650	-	1.139
SDSE16-AC-39	3"	39.1	42.2	535	-	0.895
SDSE16-AC-40	1½"	21.9	23.7	113	-	1.076
SDSE16-AC-41	1½"	19.2	20.8	67	-	0.947
SDSE16-AC-42	2"	34.9	37.7	370	15	0.870
SDSE16-AC-43	1½"	22.5	24.6	124	4	1.089
SDSE16-AC-44	2"	34.3	37.2	470	11	1.165
SDSE16-AC-45	2"	37.3	40.5	510	17	0.983
SDSE16-AC-46	1½"	36.1	39.2	545	14	1.158
SDSE16-AC-47	3"	41.7	44.5	770	-	1.062
SDSE16-AC-48	3"	39.9	43.0	645	-	1.015
SDSE16-AC-49	3"	41.1	44.5	640	-	0.922
SDSE16-AC-50	3"	35.2	38.1	460	-	1.055
SDSE16-AC-51	2"	35.0	37.6	440	-	1.026
SDSE16-AC-52	2"	29.7	31.8	262	-	1.000
SDSE16-AC-53	3"	36.4	39.7	510	-	1.057
SDSE16-AC-54	3"	32.2	34.1	272	8	0.815
SDSE16-AC-55	3"	36.1	39.2	520	-	1.105
SDSE16-AC-56	3"	35.6	38.9	490	-	1.086

Table G.30: Arctic charr measurements from fish captured at Sheardown Lake SE by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
SDSE16-AC-57	3"	33.1	36.7	375	13	1.034
SDSE16-AC-58	2"	33.3	36.1	345	12	0.934
SDSE16-AC-59	2"	35.5	38.6	500	12	1.118
SDSE16-AC-60	2"	38.5	42.3	655	13	1.148
SDSE16-AC-61	3"	38.5	40.6	540	-	0.946
SDSE16-AC-62	3"	38.5	41.8	625	-	1.095
SDSE16-AC-63	3"	34.1	37.1	420	-	1.059
SDSE16-AC-64	3"	40.2	43.5	500	-	0.770
SDSE16-AC-65	3"	38.5	41.8	550	-	0.964
SDSE16-AC-66	3"	38.5	42.2	520	-	0.911
SDSE16-AC-67	2"	40.5	43.5	585	-	0.881
SDSE16-AC-68	1½"	35.3	38.5	390	-	0.887
SDSE16-AC-69	1½"	17.5	18.9	53	-	0.989
SDSE16-AC-70	2"	41.1	44.3	705	-	1.015
SDSE16-AC-71	2"	40.2	43.6	555	-	0.854
SDSE16-AC-72	2"	32.8	35.2	380	-	1.077
SDSE16-AC-73	2"	39.7	43.1	590	19	0.943
SDSE16-AC-74	2"	40.8	44.1	660	13	0.972
SDSE16-AC-75	2"	34.2	36.9	435	10	1.087
SDSE16-AC-76	2"	36.1	39.3	435	14	0.925
SDSE16-AC-77	2"	41.8	44.9	710	15	0.972
SDSE16-AC-78*	1½"	27.4	29.8	126	7	0.613
SDSE16-AC-79	3"	39.2	43.1	550	23	0.913
SDSE16-AC-80	2"	34.0	37.0	400	9	1.018
SDSE16-AC-81	2"	36.5	39.6	430	14	0.884
SDSE16-AC-82	2"	40.0	43.5	615	15	0.961
SDSE16-AC-83	2"	34.2	37.4	370	11	0.925
Overall Catch Summary	total number	83	83	83	25	83
	average	35.5	38.4	468	13.0	0.985
	median	36.1	39.2	470	13.0	0.989
	standard deviation	5.6	6.0	179	3.8	0.098
	standard error	0.6	0.7	19.66	0.8	0.011
	minimum	17.5	18.9	53	4.0	0.613
	maximum	53.1	56.3	1,200	23.0	1.218

* Initial screening indicated sample was an outlier, and therefore the sample was removed from all subsequent statistical analysis data sets.

Table G.31: Results of health endpoint statistical comparisons for (adult) Arctic charr captured at Sheardown Lake SE littoral/profundal areas in 2016 and during the mine baseline period, Mary River Project CREMP.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Data Sets (p-value)		Power
					Baseline		2016					
	Parameter	Covariate	Baseline	2016	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	89	82	-	-	-	-	K-S Test	Yes	0.000	-
	Log_{10} Age (years)	none	9	23	-	-	-	-	ANOVA	No	0.885	-
Energy Use	Log_{10} Body Weight (g)	none	89	82	-	-	-	-	ANOVA	Yes	0.001	0.964
	Log_{10} Fork Length (cm)	none	89	82	-	-	-	-	ANOVA	Yes	0.000	0.974
	Log_{10} Body Weight (g)	Log_{10} Age (years)[1]	9	22	0.418	0.060	0.317	0.006	ANCOVA	Yes	0.011	0.842
	Log_{10} Fork Length (cm)	Log_{10} Age (years)[1]	9	22	0.323	0.111	0.401	0.002	ANCOVA	No	0.218	-
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)[2,3]	89	82	0.848	0.000	0.971	0.000	ANCOVA	No	0.840	-

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Baseline	2016	Statistic	Baseline	2016		Increase	Decrease
Survival	Age (years)	none	9	23	Mean	12.9	12.7	-	41.1	-29.1
Energy Use	Body Weight (g)	none	89	82	Mean	531.1	425.5	-19.9	-	-
	Fork Length (cm)	none	89	82	Mean	37.8	35.1	-7.2	-	-
	Body Weight (g)	Age (years)[1]	9	22	Adjusted Mean	371.6	463.5	24.7	-	-
	Fork Length (cm)	Age (years)[1]	9	22	Adjusted Mean	348.9	360.8	-	8.1	-7.5
Energy Storage	Body Weight (g)	Fork Length (cm)[2,3]	89	82	Adjusted Mean	472.4	477.4	-	4.6	-4.4

[shaded] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Young (small) Fish (SDSE16-AC-43) removed to satisfy statistical assumption of covariate overlap.

[2] Poor covariate (length) overlap.

[3] Slopes not equal, however r^2 of both ANCOVA models (interaction = 0.948, parallel slope = 0.947) using all data was above 0.80 and within 0.20.

Table G.32: Additional meristics collected from adult Arctic charr incidental mortalities at Sheardown Lake SE in 2016, Mary River Project CREMP, August 2016.

Specimen ID		Age (years)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Adjusted Body Weight (g)	Fulton's Condition Factor (K)	Sex	Liver Weight (g)	Liver Somatic Index (LSI)	Gonad Weight (g)	Gonad Somatic Index (GSI)	Gill Net Mesh Size (inches)	Abnormalities[a]
SDSE16-AC-42		15	34.9	37.7	370	365	0.870	i	5.375	1.45	-	-	2"	ew (A)
SDSE16-AC-43		4	22.5	24.6	124	122	1.089	i	1.639	1.32	-	-	1½"	none observed
SDSE16-AC-45		17	37.3	40.5	510	503	0.983	i	6.602	1.29	-	-	2"	ew (C)
SDSE16-AC-46		14	36.1	39.2	545	538	1.158	i	6.721	1.23	-	-	1½"	ew (C)
SDSE16-AC-54		8	32.2	34.1	272	270	0.815	i	2.082	0.77	-	-	3"	ew (S)
SDSE16-AC-57		13	33.1	36.7	375	372	1.034	i	3.257	0.87	-	-	3"	ew (C)
SDSE16-AC-58		12	33.3	36.1	345	341	0.934	i	4.099	1.19	-	-	2"	ew (C)
SDSE16-AC-60		13	38.5	42.3	655	648	1.148	i	6.832	1.04	-	-	2"	is (S)
SDSE16-AC-74		13	40.8	44.1	660	651	0.972	i	8.836	1.34	-	-	2"	ew (C)
SDSE16-AC-75		10	34.2	36.9	435	430	1.087	i	4.745	1.09	-	-	2"	ew (C)
SDSE16-AC-80		9	34.0	37.0	400	396	1.018	i	3.526	0.88	-	-	2"	ew (C)
SDSE16-AC-82		15	40.0	43.5	615	610	0.961	i	5.022	0.82	-	-	2"	ew (A)
SDSE16-AC-83		11	34.2	37.4	370	366	0.925	i	3.684	1.00	-	-	2"	ew (A)
SDSE16-AC-01		14	38.2	41.6	470	462	0.843	F	4.468	0.95	3.676	0.782	3"	ew (VA)
SDSE16-AC-13		13	34.5	37.7	500	451	1.218	F	6.763	1.35	42.34	8.468	3"	ew (C)
SDSE16-AC-14		16	34.9	37.6	430	422	1.012	F	4.453	1.04	3.273	0.761	2"	ew (A)
SDSE16-AC-15		12	32.7	35.2	380	336	1.087	F	7.718	2.03	36.747	9.670	2"	ew (C)
SDSE16-AC-59		12	35.5	38.6	500	487	1.118	F	7.729	1.55	5.038	1.008	2"	ew (C)
SDSE16-AC-76		14	36.1	39.3	435	427	0.925	F	3.833	0.88	3.707	0.852	2"	ew (A)
SDSE16-AC-79		23	39.2	43.1	550	539	0.913	F	5.882	1.07	5.229	0.951	3"	ew (C)
SDSE16-AC-81		14	36.5	39.6	430	423	0.884	F	4.437	1.03	2.226	0.518	2"	ew (VA)
SDSE16-AC-73		19	39.7	43.1	590	571	0.943	M	4.907	0.83	14.036	2.379	2"	ew (A)
SDSE16-AC-77		15	41.8	44.9	710	688	0.972	M	8.405	1.18	13.945	1.964	2"	ew (C)
Adult Non-Spawner Statistics	Average	11.8	34.7	37.7	437	432	1.00	-	4.802	1.10	-	-	-	-
	St. deviation	3.5	4.6	5.0	156	155	0.10	-	2.059	0.22	-	-	-	-
	Minimum	4	22.5	24.6	124	122	0.81	-	1.639	0.77	-	-	-	-
	Maximum	17	40.8	44.1	660	651	1.16	-	8.836	1.45	-	-	-	-
	Sample Size (N)	13	13	13	13	13	13	13	13	13	-	-	-	-
Females Statistics	Average	14.8	36.0	39.1	462	443	1.00	-	5.660	1.24	12.780	2.876	-	-
	St. deviation	3.6	2.1	2.5	54	59	0.13	-	1.581	0.39	16.614	3.839	-	-
	Minimum	12	32.7	35.2	380	336	0.84	-	3.833	0.88	2.226	0.518	-	-
	Maximum	23	39.2	43.1	550	539	1.22	-	7.729	2.03	42.340	9.670	-	-
	Sample Size (N)	8	8	8	8	8	8	8	8	8	8	8	-	-

[a] - Abnomalities include encysted worms (ew) in body cavity; letter in paraentheses indicates Scarce (1-5), Common (6-15), Abundant (16-50) and Very Abundant (>50) observation.

Sex - Female (F), Male (M), Indeterminate (i).

Table G.33: Arctic charr measurements from fish captured at Mary Lake by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Liver Weight (g)	Age (years)	Fulton's Condition Factor (K)
ML16-ACJ-01	8.5	9.1	4.495	0.053	2	0.732
ML16-ACJ-02	10.9	11.9	12.989	0.182	4	1.003
ML16-ACJ-03	6.5	6.9	2.799	0.048	1	1.019
ML16-ACJ-04	6.6	7.0	2.662	0.034	1	0.926
ML16-ACJ-05	6.2	6.6	2.320	0.047	1	0.973
ML16-ACJ-06	5.0	5.3	1.085	0.014	1	0.868
ML16-ACJ-07	5.4	5.9	1.525	0.036	1	0.968
ML16-ACJ-08	3.5	3.6	0.369	0.009	0	0.861
ML16-ACJ-09	4.5	4.7	0.840	0.018	0	0.922
ML16-ACJ-10	7.7	8.3	3.967	0.052	2	0.869
ML16-ACJ-11	8.1	8.8	4.626	-	-	0.870
ML16-ACJ-12	8.3	8.8	4.254	-	-	0.744
ML16-ACJ-13	8.6	9.2	4.868	-	-	0.765
ML16-ACJ-14	8.2	8.8	4.539	-	-	0.823
ML16-ACJ-15	6.2	6.5	2.347	-	-	0.985
ML16-ACJ-16	6.0	6.4	2.109	-	-	0.976
ML16-ACJ-17	7.1	7.5	3.159	-	-	0.883
ML16-ACJ-18	11.1	12.0	15.206	-	-	1.112
ML16-ACJ-19	8.2	8.9	4.701	-	-	0.853
ML16-ACJ-20	13.6	14.7	25.937	-	-	1.031
ML16-ACJ-21	11.8	12.7	13.345	-	-	0.812
ML16-ACJ-22	9.3	10.1	8.195	-	-	1.019
ML16-ACJ-23	8.3	8.8	4.969	-	-	0.869
ML16-ACJ-24	8.8	9.4	6.157	-	-	0.903
ML16-ACJ-25	9.8	10.8	8.027	-	-	0.853
ML16-ACJ-26	8.2	8.9	4.627	-	-	0.839
ML16-ACJ-27	7.5	8.0	3.804	-	-	0.902
ML16-ACJ-28	8.8	9.6	5.642	-	-	0.828
ML16-ACJ-29	9.2	9.7	7.019	-	-	0.901
ML16-ACJ-30	9.9	10.8	8.944	-	-	0.922
ML16-ACJ-31	7.0	7.5	2.741	-	-	0.799
ML16-ACJ-32	8.6	9.3	5.454	-	-	0.857
ML16-ACJ-33	10.7	11.6	9.901	-	-	0.808
ML16-ACJ-34	12.7	13.8	19.760	-	-	0.965
ML16-ACJ-35	13.0	14.2	20.760	-	-	0.945
ML16-ACJ-36	10.8	11.8	11.388	-	-	0.904
ML16-ACJ-37	7.8	8.4	4.220	-	-	0.889
ML16-ACJ-38	8.4	9.0	5.094	-	-	0.859
ML16-ACJ-39	7.2	7.7	3.254	-	-	0.872
ML16-ACJ-40*	7.2	7.7	19.541	-	-	5.235
ML16-ACJ-41	7.0	7.5	3.187	-	-	0.929
ML16-ACJ-42	7.9	8.4	4.342	-	-	0.881
ML16-ACJ-43	9.4	10.1	7.014	-	-	0.844
ML16-ACJ-44	6.3	6.7	2.190	-	-	0.876
ML16-ACJ-45	6.6	6.9	2.425	-	-	0.843
ML16-ACJ-46	6.9	7.3	3.078	-	-	0.937
ML16-ACJ-47	7.0	7.5	2.778	-	-	0.810
ML16-ACJ-48	6.5	7.0	2.434	-	-	0.886
ML16-ACJ-49	8.8	9.5	6.155	-	-	0.903
ML16-ACJ-50	6.6	7.1	2.809	-	-	0.977
ML16-ACJ-51	9.9	10.6	7.730	-	-	0.797
ML16-ACJ-52	8.2	8.8	4.935	-	-	0.895
ML16-ACJ-53	7.0	7.5	2.938	-	-	0.857
ML16-ACJ-54	8.8	9.5	5.687	-	-	0.835
ML16-ACJ-55	6.7	7.4	3.119	-	-	1.037
ML16-ACJ-56	6.7	7.2	2.859	-	-	0.951
ML16-ACJ-57	6.7	7.2	2.501	-	-	0.832
ML16-ACJ-58	6.2	6.7	2.128	-	-	0.893
ML16-ACJ-59	6.2	6.7	2.011	-	-	0.844

Table G.33: Arctic charr measurements from fish captured at Mary Lake by electrofishing, Mary River Project CREMP, August 2016.

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Liver Weight (g)	Age (years)	Fulton's Condition Factor (K)
ML16-ACJ-60		8.8	9.5	5.009	-	-	0.735
ML16-ACJ-61		10.0	10.8	8.885	-	-	0.889
ML16-ACJ-62		7.2	7.7	3.451	-	-	0.925
ML16-ACJ-63		11.1	11.9	11.497	-	-	0.841
ML16-ACJ-64		7.1	7.6	3.213	-	-	0.898
ML16-ACJ-65		6.3	6.6	2.119	-	-	0.847
ML16-ACJ-66		9.4	10.1	7.504	-	-	0.903
ML16-ACJ-67		6.0	6.4	2.007	-	-	0.929
ML16-ACJ-68		6.6	7.0	2.615	-	-	0.910
ML16-ACJ-69		7.3	7.7	3.481	-	-	0.895
ML16-ACJ-70		7.3	7.2	3.677	-	-	0.945
ML16-ACJ-71		7.0	7.5	2.893	-	-	0.843
ML16-ACJ-72		8.0	8.5	5.392	-	-	1.053
ML16-ACJ-73		5.7	6.1	1.554	-	-	0.839
ML16-ACJ-74		5.2	5.4	1.203	-	-	0.856
ML16-ACJ-75		7.2	7.5	2.899	-	-	0.777
ML16-ACJ-76		8.8	9.4	4.500	-	-	0.660
ML16-ACJ-77		7.3	7.7	2.992	-	-	0.769
ML16-ACJ-78		8.3	8.8	4.163	-	-	0.728
ML16-ACJ-79		5.3	5.5	1.112	-	-	0.747
ML16-ACJ-80		8.5	9.2	5.807	-	-	0.946
ML16-ACJ-81		5.8	6.1	1.612	-	-	0.826
ML16-ACJ-82		9.9	10.6	8.093	-	-	0.834
ML16-ACJ-83		9.2	9.8	4.686	-	-	0.602
ML16-ACJ-84		8.8	9.4	5.393	-	-	0.791
ML16-ACJ-85		12.4	13.4	16.240	-	-	0.852
ML16-ACJ-86		7.4	7.9	3.499	-	-	0.863
ML16-ACJ-87		7.8	8.3	4.005	-	-	0.844
ML16-ACJ-88		8.7	9.6	5.601	-	-	0.851
ML16-ACJ-89		5.7	6.0	1.744	-	-	0.942
ML16-ACJ-90		6.3	6.7	2.149	-	-	0.859
ML16-ACJ-91		5.8	6.2	1.689	-	-	0.866
ML16-ACJ-92		6.9	7.2	2.856	-	-	0.869
ML16-ACJ-93		6.5	7.0	2.290	-	-	0.834
ML16-ACJ-94		6.9	7.5	3.006	-	-	0.915
ML16-ACJ-95		6.2	6.7	2.017	-	-	0.846
ML16-ACJ-96		5.3	5.8	1.732	-	-	1.163
ML16-ACJ-97		4.9	5.1	1.102	-	-	0.937
ML16-ACJ-98		3.5	3.6	0.485	-	-	1.131
ML16-ACJ-99		6.5	7.0	2.349	-	-	0.855
ML16-ACJ-100		9.3	10.1	6.984	-	-	0.868
Overall Catch Summary	total number	100	100	100	10	10	100
	average	7.8	8.3	5.115	0.049	1.3	0.925
	median	7.3	7.7	3.588	0.042	1	0.869
	standard deviation	1.9	2.2	4.579	0.049	1.2	0.444
	standard error	0.2	0.2	0.458	0.016	0.4	0.044
	minimum	3.5	3.6	0.369	0.009	0	0.602
	maximum	13.6	14.7	25.937	0.182	4	5.235
Young-of-the-Year Catch Summary	proportion of YOY	4%					
	total number	4	4	4	2	2	4
	average	4.1	4.3	0.699	0.014	0.0	0.963
	median	4.0	4.2	0.663	0.014	0	0.929
	standard deviation	0.7	0.8	0.335	0.006	0.0	0.117
	standard error	0.4	0.4	0.168	0.005	0.0	0.059
	minimum	3.5	3.6	0.369	0.009	0	0.861
	maximum	4.9	5.1	1.102	0.018	0	1.131

Table G.34: Results of health endpoint statistical comparisons for nearshore (non-YOY) Arctic charr captured between mine-exposed Mary Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (p-value)		Power
					Reference		Exposed					
	Parameter	Covariate	Ref	Exp	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	99	99	-	-	-	-	K-S Test	Yes	0.000	-
	Log_{10} Age (years)	none	10	10	-	-	-	-	ANOVA	No	0.801	-
Energy Use (non-YOY)	Log_{10} Body Weight (g)	none	68	94	-	-	-	-	ANOVA	No	0.610	-
	Log_{10} Fork Length (cm)	none	68	94	-	-	-	-	ANOVA	No	0.626	-
	Log_{10} Body Weight (g)	Log_{10} Age (years)[1]	9	10	0.980	0.000	0.875	0.000	ANCOVA	No	0.219	-
	Log_{10} Fork Length (cm)	Log10 Age (years)[1]	9	10	0.978	0.000	0.890	0.000	ANCOVA	No	0.117	-
Energy Storage (non-YOY)	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)[2]	68	94	0.985	0.000	0.977	0.000	ANCOVA	No	0.848	-

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]	Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Ref	Exp	Statistic	Ref	Exp		Increase	Decrease
Survival	Age (years)	none	10	10	Mean	0.9	1.0	-	292.6	-74.5
Energy Use (non-YOY)	Body Weight (g)	none	68	94	Mean	3.862	4.099	-	41	-29
	Fork Length (cm)	none	68	94	Mean	7.6	7.8	-	11.8	-10.5
	Body Weight (g)	Age (years)[1]	9	10	Adjusted Mean	1.839	2.187	-	57.6	-36.5
	Fork Length (cm)	Age (years)[1]	9	10	Adjusted Mean	5.8	6.2	-	15.7	-13.6
Energy Storage	Body Weight (g)	Fork Length (cm)[2]	68	94	Adjusted Mean	4.0	4.0	-	4.9	-4.6

[shaded] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

[1] Studentized outlier REF316-ACJ-8 removed.

[2] Slopes not equal, however r^2 of both ANCOVA models (interaction = 0.981, parallel slope = 0.981) using all data was above 0.80 and within 0.20.

Table G.35: Sample sizes required to detect differences in Arctic charr non-lethal population endpoints for nearshore and littoral/profundal populations at Mary Lake compared to Reference Lake 3 or Mary Lake baseline data, as appropriate, with power = 0.90 and alpha = 0.10 using the 2016 data. Highlighted values indicate sample sizes sufficient to meet CES used for EEM studies.

Mine Lake	Endpoint		Model[a]	Minimum Sample Size (Increase[b] / Decrease[c])							
	Parameter	Covariate		i=5%	i=10%	i=20%	i=25%	i=30%	i=40%	i=50%	i=100%
				d=4%	d=9%	d=17%	d=20	d=23%	d=29%	d=33%	d=50%
Nearshore Electrofishing: Mary Lake versus Reference Lake 3	Body Weight	none	ANOVA	7,202	1889	517	346	250	153	106	37
	Fork Length	none	ANOVA	770	203	56	38	28	17	12	5
	Body Weight	Age	ANCOVA	632	167	46	31	23	14	10	4
	Fork Length	Age	ANCOVA	66	18	6	4	3	3	2	1
	Body Weight	Fork Length	All - ANCOVA	68	19	6	4	3	3	2	2
	Body Weight	Fork Length	YOY Only ANCOVA	-	-	-	-	-	-	-	-
	Body Weight	Fork Length	Non-YOY Only ANCOVA	48	13	5	3	3	2	2	1
Nearshore Electrofishing: Mary Lake versus 2014 data	Body Weight	none	ANOVA	4,436	1,164	319	213	155	95	66	23
	Fork Length	none	ANOVA	489	129	36	25	18	11	8	4
	Body Weight	Fork Length	ANCOVA	117	32	9	7	5	4	3	2
Littoral / Profundal Gill Netting: Mary Lake versus Baseline	Body Weight	none	ANOVA	3,239	850	233	156	113	69	48	17
	Fork Length	none	ANOVA	382	101	28	19	14	9	7	3
	Body Weight	Age	ANCOVA	1,962	515	142	95	69	42	30	11
	Fork Length	Age	ANCOVA	183	49	14	10	7	5	4	2
	Body Weight	Fork Length	ANCOVA	120	32	10	7	5	4	3	2

[a] Statistical tests include Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), Mann-Whitney U-Test (MW U-test) and Kolmogorov-Smirnov test (K-S Test).

[b] Increase relative to reference mean using log transformed data

[c] Decrease relative to reference mean using log transformed data

Table G.36: Arctic charr measurements from fish captured at Mary Lake by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor
ML16-AC-01	3"	56.0	59.8	1,280	-	0.729
ML16-AC-02	3"	38.2	41.6	560	-	1.005
ML16-AC-03	3"	35.6	39.0	395	-	0.875
ML16-AC-04	3"	38.2	41.3	565	-	1.014
ML16-AC-05	3"	37.2	40.2	485	-	0.942
ML16-AC-06	3"	38.9	42.2	620	-	1.053
ML16-AC-07	2"	38.0	41.2	535	16	0.975
ML16-AC-08	2"	28.9	31.4	210	8	0.870
ML16-AC-09	2"	44.5	48.2	760	-	0.862
ML16-AC-10	2"	40.8	44.7	625	-	0.920
ML16-AC-11	2"	35.5	38.8	440	-	0.983
ML16-AC-12	2"	37.5	40.7	485	-	0.920
ML16-AC-13	2"	37.2	40.2	445	-	0.864
ML16-AC-14	2"	36.1	39.2	465	-	0.988
ML16-AC-15	1½"	38.3	41.5	485	-	0.863
ML16-AC-16	3"	73.0	77.8	> 2,500	-	> 0.64
ML16-AC-17	3"	66.0	71.4	> 2,500	-	> 0.87
ML16-AC-18	3"	33.5	36.4	355	-	0.944
ML16-AC-19	3"	67.6	72.5	> 2,500	-	> 0.81
ML16-AC-20	3"	68.1	73.0	2,440	-	0.773
ML16-AC-21	3"	41.1	44.4	700	-	1.008
ML16-AC-22	3"	36.5	39.5	460	12	0.946
ML16-AC-23	2"	35.0	37.9	315	-	0.735
ML16-AC-24	2"	25.5	27.8	151	-	0.911
ML16-AC-25	2"	38.1	41.5	560	15	1.013
ML16-AC-26	2"	38.4	41.6	460	19	0.812
ML16-AC-27	2"	35.0	38.0	435	10	1.015
ML16-AC-28	2"	37.8	41.2	565	-	1.046
ML16-AC-29	1½"	40.9	44.1	600	-	0.877
ML16-AC-30	1½"	40.5	43.4	625	-	0.941
ML16-AC-31	3"	60.2	64.3	2,040	21	0.935
ML16-AC-32	3"	38.5	41.7	495	-	0.867
ML16-AC-33	3"	37.7	41.3	535	-	0.998
ML16-AC-34	3"	38.7	35.9	450	-	0.776
ML16-AC-35	3"	34.1	37.2	435	-	1.097
ML16-AC-36	3"	38.7	42.3	510	-	0.880
ML16-AC-37	3"	40.6	44.1	590	-	0.882
ML16-AC-38	1½"	36.5	39.8	465	-	0.956
ML16-AC-39	3"	40.5	44.1	630	19	0.948
ML16-AC-40	3"	38.5	41.8	530	-	0.929
ML16-AC-41	3"	35.8	38.9	470	-	1.024
ML16-AC-42	2"	35.4	38.1	425	9	0.958
ML16-AC-43	2"	33.0	35.6	315	11	0.877
ML16-AC-44	2"	30.4	33.1	245	8	0.872
ML16-AC-45	2"	40.3	44.3	650	-	0.993
ML16-AC-46	2"	38.3	41.6	500	-	0.890
ML16-AC-47	1½"	33.6	36.6	480	10	1.265
ML16-AC-48	1½"	30.2	32.8	360	9	1.307
ML16-AC-49	1½"	30.4	33.0	280	9	0.997
ML16-AC-50	1½"	28.8	31.4	222	7	0.929
ML16-AC-51	1½"	30.6	33.3	276	4	0.963
ML16-AC-52	1½"	30.8	33.7	285	-	0.975
ML16-AC-53	1½"	35.9	39.1	445	-	0.962
ML16-AC-54	2"	39.4	42.5	530	15	0.867
ML16-AC-55	2"	31.7	34.8	294	-	0.923
ML16-AC-56	2"	29.9	32.4	262	-	0.980

Table G.36: Arctic charr measurements from fish captured at Mary Lake by gill netting, Mary River Project CREMP, August 2016.

Specimen ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor
ML16-AC-57	2"	38.5	42.2	520	15	0.911
ML16-AC-58	2"	33.2	36.3	405	13	1.107
ML16-AC-59	2"	31.5	34.7	295	10	0.944
ML16-AC-60	1½"	35.4	38.5	475	-	1.071
ML16-AC-61	1½"	18.0	19.5	47	-	0.806
ML16-AC-62	3"	40.3	42.9	540	-	0.825
ML16-AC-63	3"	39.9	43.0	590	-	0.929
ML16-AC-64	3"	36.2	39.0	460	-	0.970
ML16-AC-65	3"	39.6	42.7	625	-	1.006
ML16-AC-66	2"	32.6	35.6	345	8	0.996
ML16-AC-67	2"	37.9	41.3	555	14	1.019
ML16-AC-68	2"	31.4	34.0	285	-	0.921
ML16-AC-69	2"	39.2	42.5	540	15	0.896
ML16-AC-70	2"	36.1	38.8	505	13	1.073
ML16-AC-71	2"	37.1	41.0	545	-	1.067
ML16-AC-72	2"	36.1	38.9	450	-	0.957
ML16-AC-73	2"	41.1	44.4	570	-	0.821
ML16-AC-74	1½"	40.1	43.4	475	-	0.737
ML16-AC-75	1½"	36.9	40.1	475	-	0.945
ML16-AC-76	2"	36.7	40.0	490	11	0.991
ML16-AC-77	2"	35.0	38.1	485	11	1.131
ML16-AC-78	2"	28.2	30.3	180	-	0.803
ML16-AC-79	2"	28.8	31.2	204	9	0.854
ML16-AC-80	1½"	28.6	31.2	233	-	0.996
ML16-AC-81	1½"	37.5	40.5	480	-	0.910
ML16-AC-82	1½"	33.3	36.1	365	-	0.988
ML16-AC-83	3"	65.3	70.2	2,490	-	0.894
ML16-AC-84	3"	40.0	44.4	590	-	0.922
ML16-AC-85	3"	40.2	43.9	640	-	0.985
ML16-AC-86	2"	42.9	46.5	675	-	0.855
ML16-AC-87	2"	39.0	42.5	525	-	0.885
ML16-AC-88	2"	37.1	40.6	500	-	0.979
ML16-AC-89	2"	31.8	34.6	325	-	1.011
ML16-AC-90	2"	28.2	31.0	215	-	0.959
ML16-AC-91	1½"	37.1	40.1	460	-	0.901
ML16-AC-92	1½"	27.4	29.7	199	-	0.967
ML16-AC-93	3"	37.8	41.3	545	-	1.009
ML16-AC-94	3"	37.3	40.5	515	-	0.992
ML16-AC-95	3"	40.8	44.6	640	-	0.942
ML16-AC-96	2"	30.9	33.7	258	-	0.874
ML16-AC-97	2"	40.8	44.1	530	-	0.780
Overall Catch Summary	total number	97	97	94	27	97
	average	38.0	41.1	521	11.9	0.9
	median	37.2	40.5	483	11	0.9
	standard deviation	8.9	9.4	369	4.0	0.1
	standard error	0.9	1.0	38.0	0.8	0.0
	minimum	18.0	19.5	47	4	0.6
	maximum	73.0	77.8	2,490	21	1.3

Table G.37: Results of health endpoint statistical comparisons for (adult) Arctic charr captured at Mary Lake littoral/profundal areas in 2016 and during the mine baseline period, Mary River Project CREMP.

a) Statistical results based on log-transformed data

Response	Endpoint		Sample Size		Regression Relationship Between Parameter and Covariate				Model	Statistical Difference Between Areas (p-value)		Power
					Baseline		2015					
	Parameter	Covariate	Baseline	2015	r	p-value	r	p-value				
Survival	Fork Length Distribution	none	161	94	-	-	-	-	K-S Test	Yes	0.000	-
	Log_{10} Age (years)	none	84	27	-	-	-	-	ANOVA	Yes	0.022	0.749
Energy Use	Log_{10} Body Weight (g)	none	161	94	-	-	-	-	ANOVA	No	0.606	-
	Log_{10} Fork Length (cm)	none	161	94	-	-	-	-	ANOVA	No	0.358	-
	Log_{10} Body Weight (g)	Log_{10} Age (years)[2,3]	84	25	0.470	0.000	0.640	0.000	ANCOVA	Yes	0.007	-
	Log_{10} Fork Length (cm)	Log_{10} Age (years)[2,3]	84	25	0.499	0.000	0.774	0.000	ANCOVA	Yes	0.004	-
Energy Storage	Log_{10} Adj. Body Weight (g)	Log_{10} Fork Length (cm)	161	94	0.964	0.000	0.963	0.000	ANCOVA	Yes	0.044	0.645

b) Results expressed as anti-logged values

Response	Endpoint		Sample Size		Mean, Adjusted Mean or Predicted Value[a]			Magnitude of Difference (%)[b,c]		Minimum Detectable Effect Size (%)[d]	
	Parameter	Covariate	Baseline	2015	Statistic	Baseline	2015			Increase	Decrease
Survival	Age (years)	none	84	27	Mean	13.0	11.2	-13.7		-	-
Energy Use	Body Weight (g)	none	161	94	Mean	472.6	451.8	-		28.2	-22.0
	Fork Length (cm)	none	161	94	Mean	37.4	36.4	-		8.9	-8.2
	Body Weight (g)	Age (years)[2,3]	84	25	Predicted Values	1,082.1	651.2	Max overlap	-39.8	-	-
						158.1	284.7	Min overlap	80.1		
	Fork Length (cm)	Age (years)[2,3]	84	25	Predicted Values	495.5	409.7	Max overlap	-17.3	-	-
						247.7	305.6	Min overlap	23.4		
Energy Storage	Body Weight (g)	Fork Length (cm)	161	94	Adjusted Mean	459.1	475.0	3.5		-	-

[grey box] - indicates a significant ($p < 0.10$) difference between areas.

[a] The mean and adjusted mean is reported for ANOVAs and ANCOVAs, respectively, and the predicted values of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., difference in slopes) occurs and cannot be resolved by removing outliers, and the r^2 for the ANCOVA models with and without the interaction term are less than 0.8 or differ by more than 0.02.

[b] ANCOVA: magnitude of difference between antilogged adjusted means for reference and exposed areas calculated as: [(exposed adjusted mean - reference adjusted mean) /reference adjusted mean] x 100.

[c] ANCOVA with Interaction: magnitude of difference between predicted minimum and maximum values for reference and exposed areas calculated as: [(exposed predicted value - reference predicted value) / reference predicted value] x 100.

[d] Minimum detectable effect size (see methods section of report for formula).

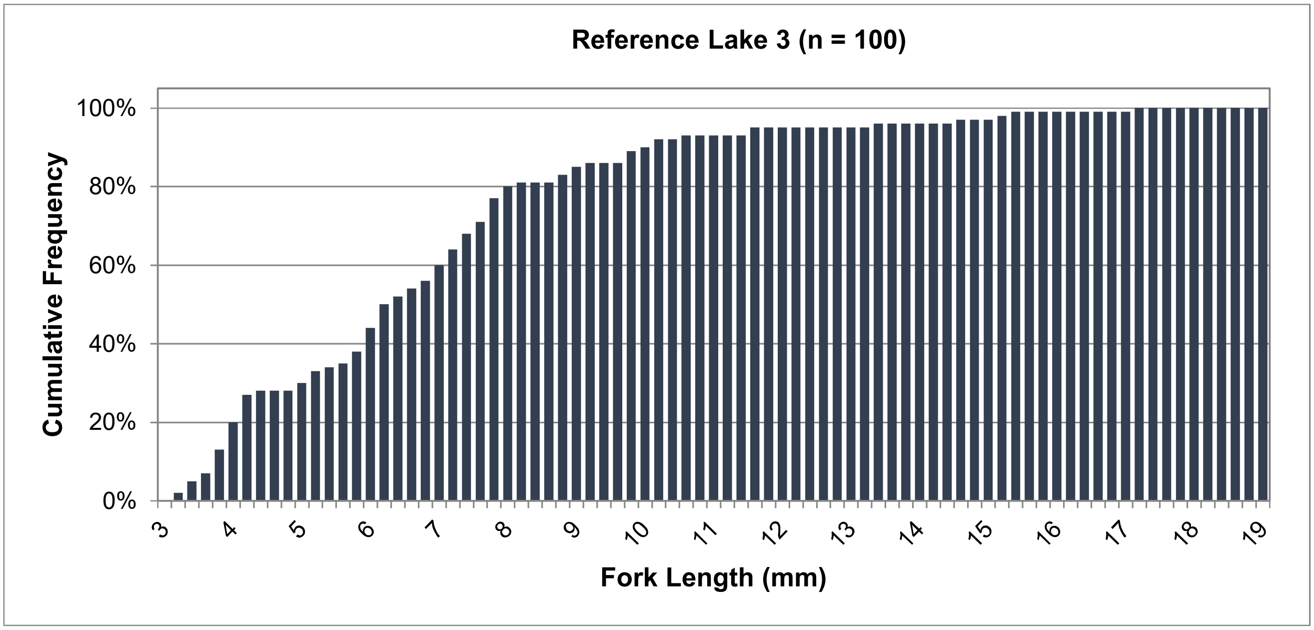
[1] Poor covariate (age) overlap.
[2] Young (small) Fish (ML16-AC-51) removed to satisfy statistical assumption of covariate overlap.
[3] Studentized outlier CL16-AC-83 removed.

Table G.38: Additional meristics collected from Arctic charr incidental mortalities at Mary Lake in 2016, Mary River Project CREMP, August 2016

Specimen ID		Age (years)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Adjusted Body Weight (g)	Fulton's Condition Factor (K)	Sex	Liver Weight (g)	Liver Somatic Index (LSI)	Gonad Weight (g)	Gonad Somatic Index (GSI)	Gill Net Mesh Size (inches)	Abnormalities[a]
ML16-AC-08		8	28.9	31.4	210	208	0.870	i	2.247	1.07	-	-	2"	ew (S)
ML16-AC-22		12	36.5	39.5	460	455	0.946	i	4.535	0.99	-	-	3"	ew (A)
ML16-AC-25		15	38.1	41.5	560	554	1.013	i	5.716	1.02	-	-	2"	ew (VA)
ML16-AC-31		21	60.2	64.3	2,040	2,019	0.935	i	21.297	1.04	-	-	3"	ew (A)
ML16-AC-39		19	40.5	44.1	630	624	0.948	i	6.382	1.01	-	-	3"	ew (C)
ML16-AC-42		9	35.4	38.1	425	420	0.958	i	4.903	1.15	-	-	2"	ew (S)
ML16-AC-43		11	33.0	35.6	315	313	0.877	i	2.274	0.72	-	-	2"	ew (C)
ML16-AC-44		8	30.4	33.1	245	243	0.872	i	2.256	0.92	-	-	2"	ew (S)
ML16-AC-47		10	33.6	36.6	480	476	1.265	i	4.158	0.87	-	-	1½"	ew (C)
ML16-AC-48		9	30.2	32.8	360	358	1.307	i	2.465	0.68	-	-	1½"	ew (S)
ML16-AC-50		7	28.8	31.4	222	220	0.929	i	2.496	1.12	-	-	1½"	ew (S)
ML16-AC-51		4	30.6	33.3	276	273	0.963	i	2.972	1.08	-	-	1½"	is (C)
ML16-AC-54		15	39.4	42.5	530	524	0.867	i	5.773	1.09	-	-	2"	ew (A)
ML16-AC-57		15	38.5	42.2	520	515	0.911	i	4.820	0.93	-	-	2"	ew (C)
ML16-AC-67		14	37.9	41.3	555	549	1.019	i	5.883	1.06	-	-	2"	ew (VA)
ML16-AC-76		11	36.7	40.0	490	485	0.991	i	5.132	1.05	-	-	2"	ew (C)
ML16-AC-79		9	28.8	31.2	204	202	0.854	i	2.014	0.99	-	-	2"	none observed
ML16-AC-07		16	38.0	41.2	535	477	0.975	F	9.677	1.81	48.548	9.074	2"	ew (C)
ML16-AC-26		19	38.4	41.6	460	452	0.812	F	4.751	1.03	3.179	0.691	2"	ew (C)
ML16-AC-27		10	35.0	38.0	435	429	1.015	F	3.049	0.70	3.124	0.718	2"	none observed
ML16-AC-49		9	30.4	33.0	280	276	0.997	F	2.722	0.97	1.012	0.361	1½"	ew (C)
ML16-AC-58		13	33.2	36.3	405	397	1.107	F	3.947	0.97	3.830	0.946	2"	ew (VA)
ML16-AC-59		10	31.5	34.7	295	291	0.944	F	2.675	0.91	1.445	0.490	2"	ew (A)
ML16-AC-66		8	32.6	35.6	345	340	0.996	F	3.908	1.13	0.852	0.247	2"	ew (C) + liver parasite
ML16-AC-69		15	39.2	42.5	540	531	0.896	F	4.506	0.83	4.505	0.834	2"	none observed
ML16-AC-70		13	36.1	38.8	505	441	1.073	F	9.082	1.80	54.793	10.850	2"	none observed
ML16-AC-77		11	35.0	38.1	485	478	1.131	F	4.181	0.86	2.546	0.525	2"	ew (VA)
Adult Non-Spawner Statistics	Average	11.6	35.7	38.8	501	496	0.972	-	5.019	0.99	-	-	-	-
	St. deviation	4.4	7.5	7.9	420	416	0.129	-	4.463	0.13	-	-	-	-
	Minimum	4	28.8	31.2	204	202	0.854	-	2.014	0.68	-	-	-	-
	Maximum	21	60.2	64.3	2,040	2019	1.307	-	21.297	1.15	-	-	-	-
	Sample Size (N)	17	17	17	17	17	17	17	17	17	-	-	-	-
Females Statistics	Average	12.4	34.9	38.0	429	411	0.995	-	4.850	1.10	12.383	2.474	-	-
	St. deviation	3.5	3.0	3.1	95	84	0.096	-	2.494	0.39	20.792	3.974	-	-
	Minimum	8	30.4	33.0	280	276	0.812	-	2.675	0.70	0.852	0.247	-	-
	Maximum	19	39.2	42.5	540	531	1.131	-	9.677	1.81	54.793	10.850	-	-
	Sample Size (N)	10	10	10	10	10	10	10	10	10	10	10	-	-

[a] - Abnomalities include encysted worms (ew) in body cavity; letter in paraentheses indicates Scarce (1-5), Common (6-15), Abundant (16-50) and Very Abundant (>50) observation.

Sex - Female (F), Indeterminate (i).



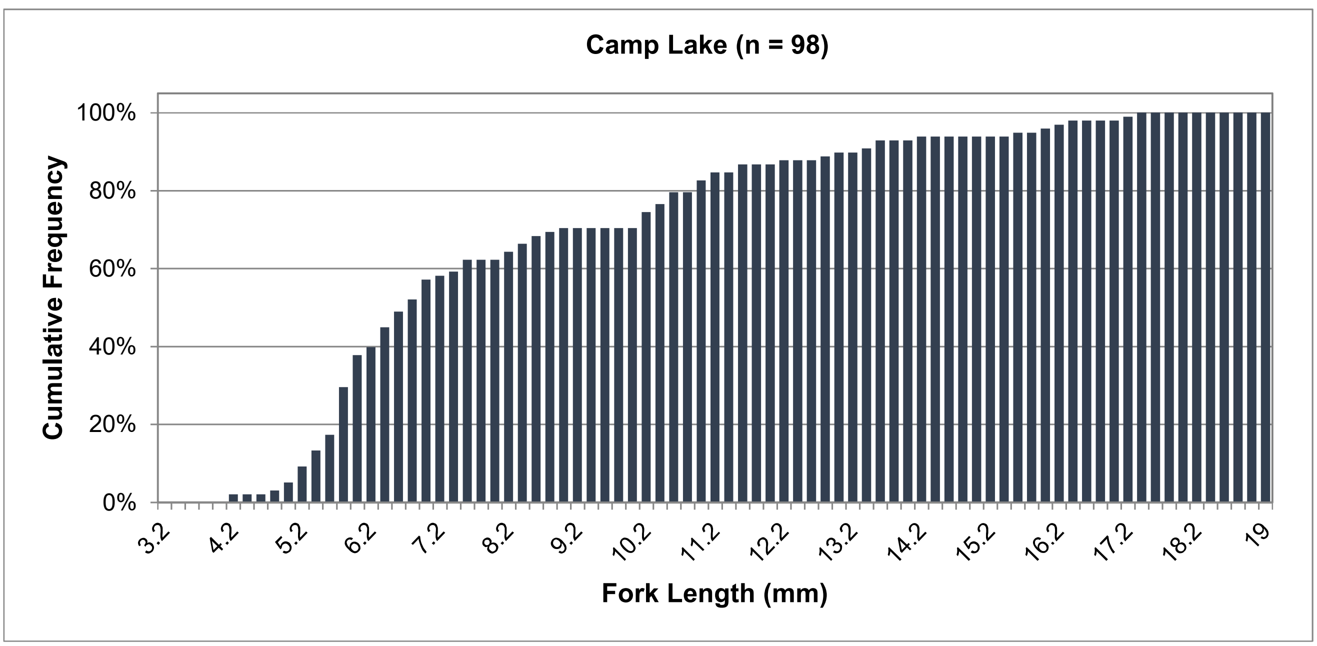


Figure G.1: Cumulative length-frequency distributions for juvenile Arctic charr captured by electrofishing at nearshore areas of Camp Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

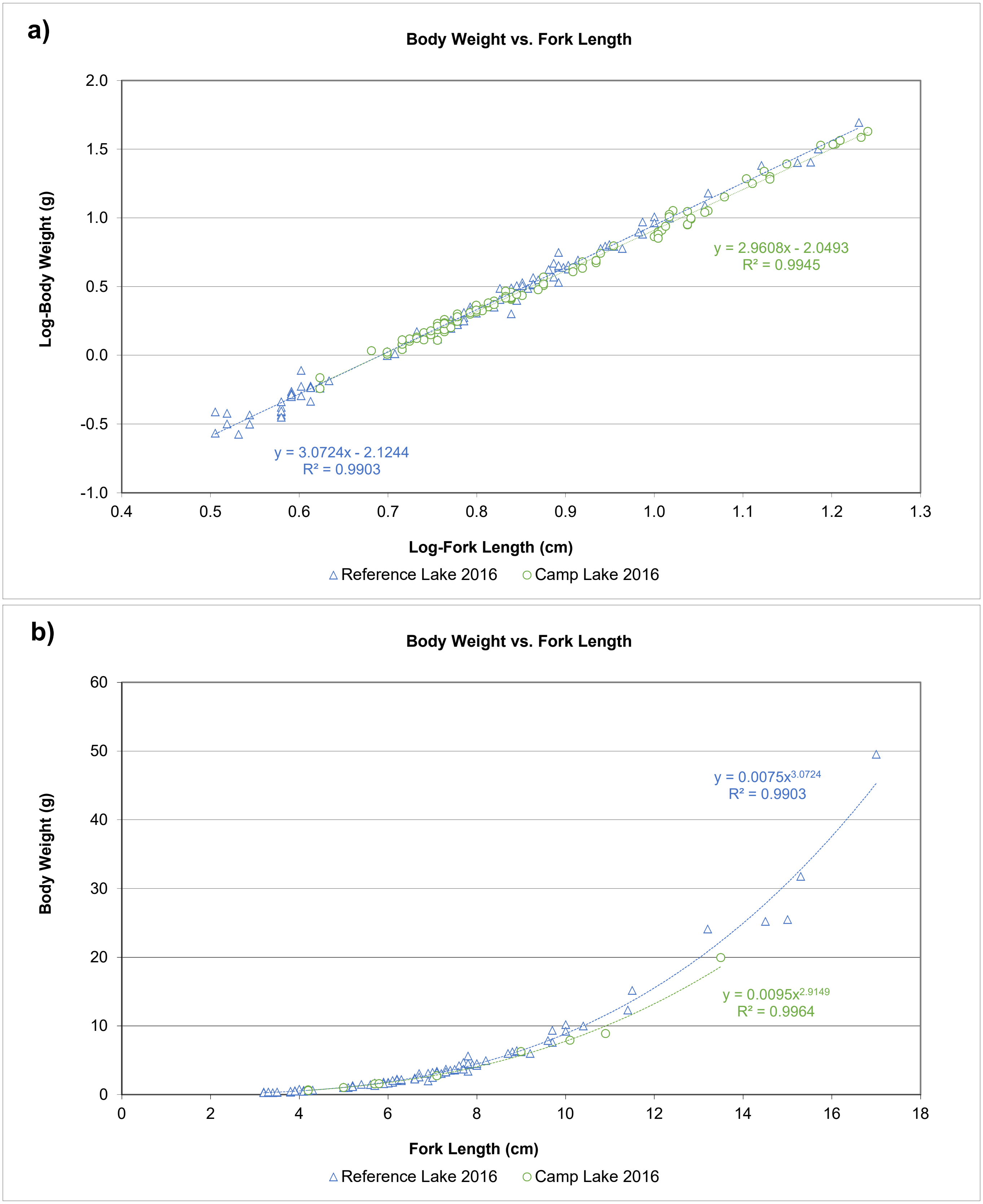


Figure G.2: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected at the nearshore area of Camp Lake and Reference Lake 3 in August 2016 using log-transformed (a) and untransformed (b) data, Mary River Project CREMP, 2016.

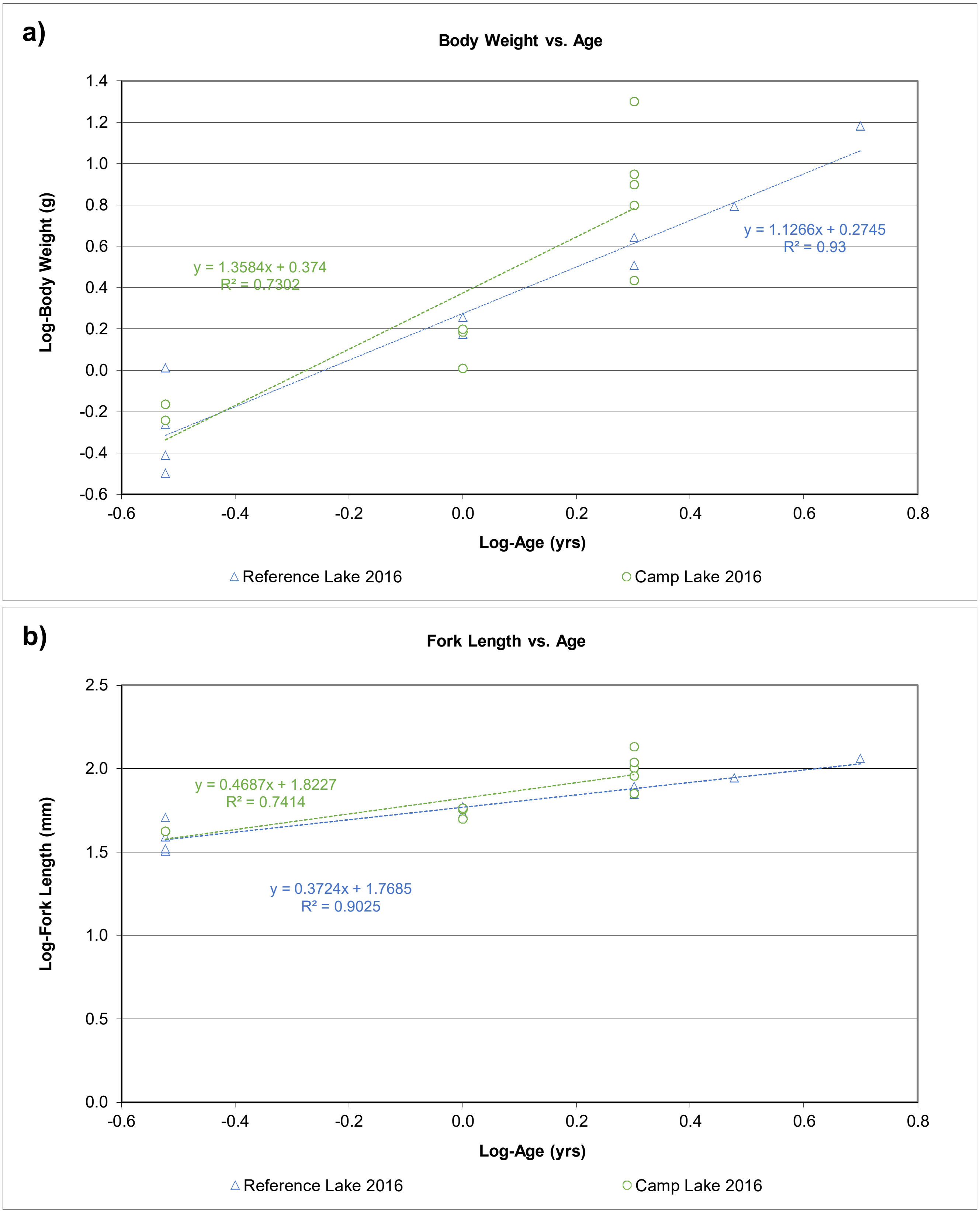
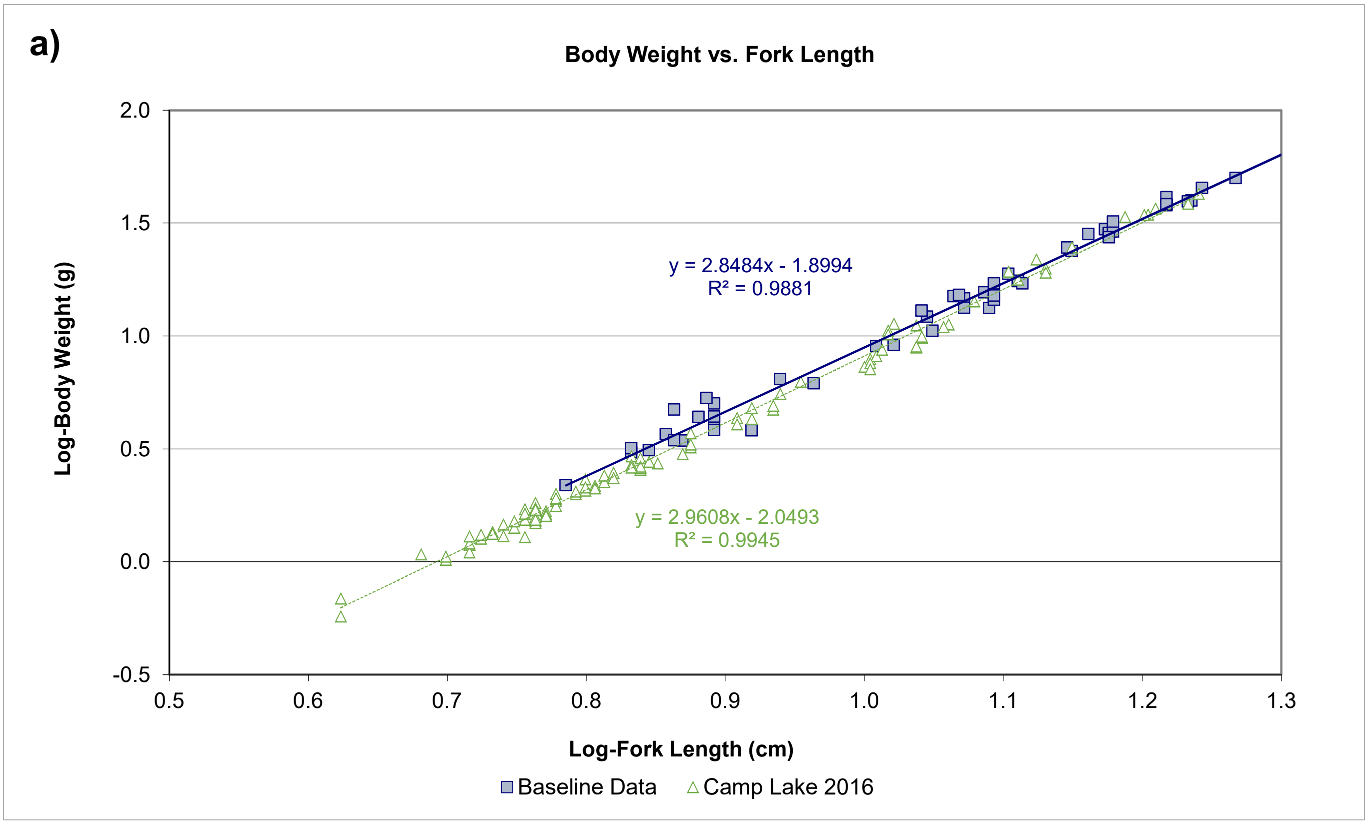


Figure G.3: Weight-at-age (a) and length-at-age (b) growth relationships for Arctic charr collected at the nearshore area of Camp Lake and Reference Lake 3, Mary River Project CREMP, August 2016.



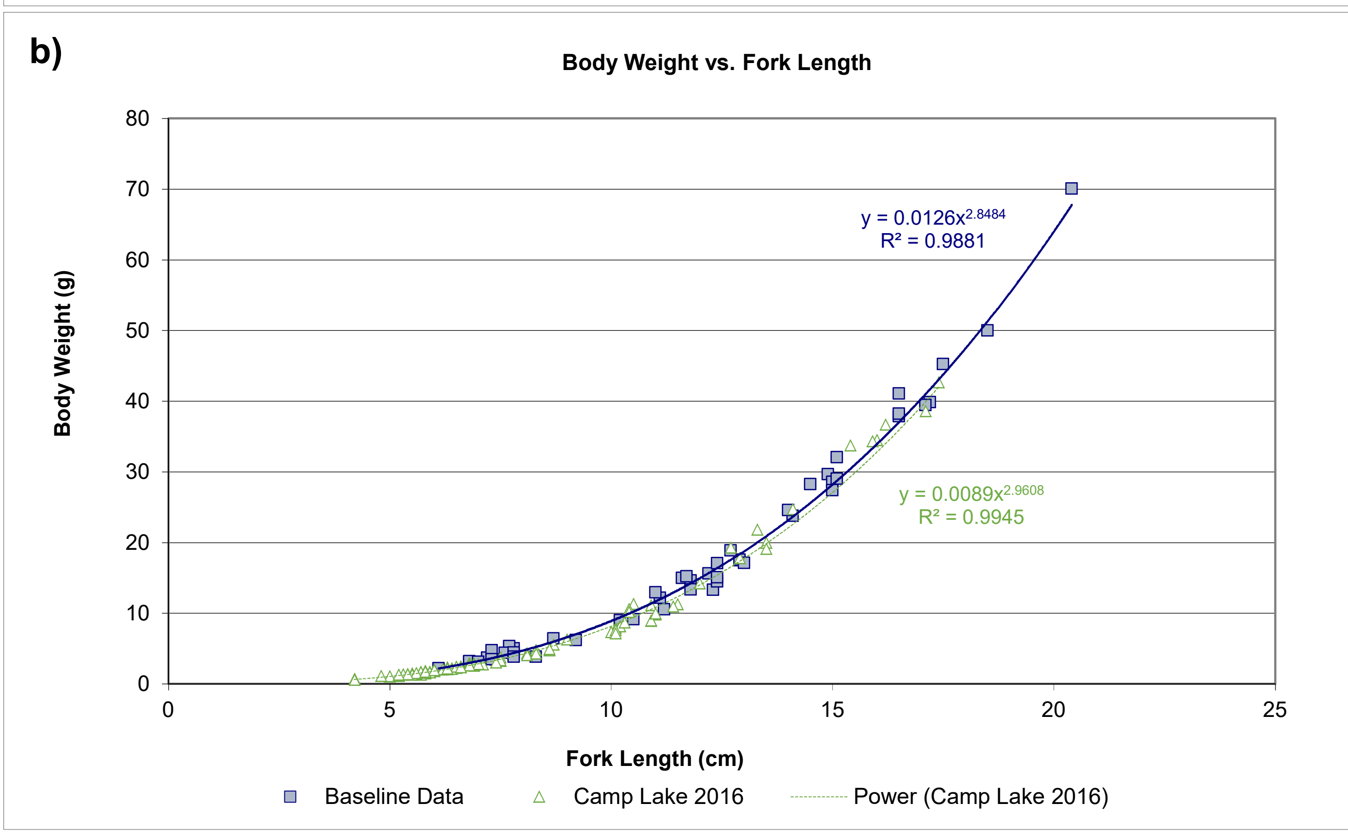
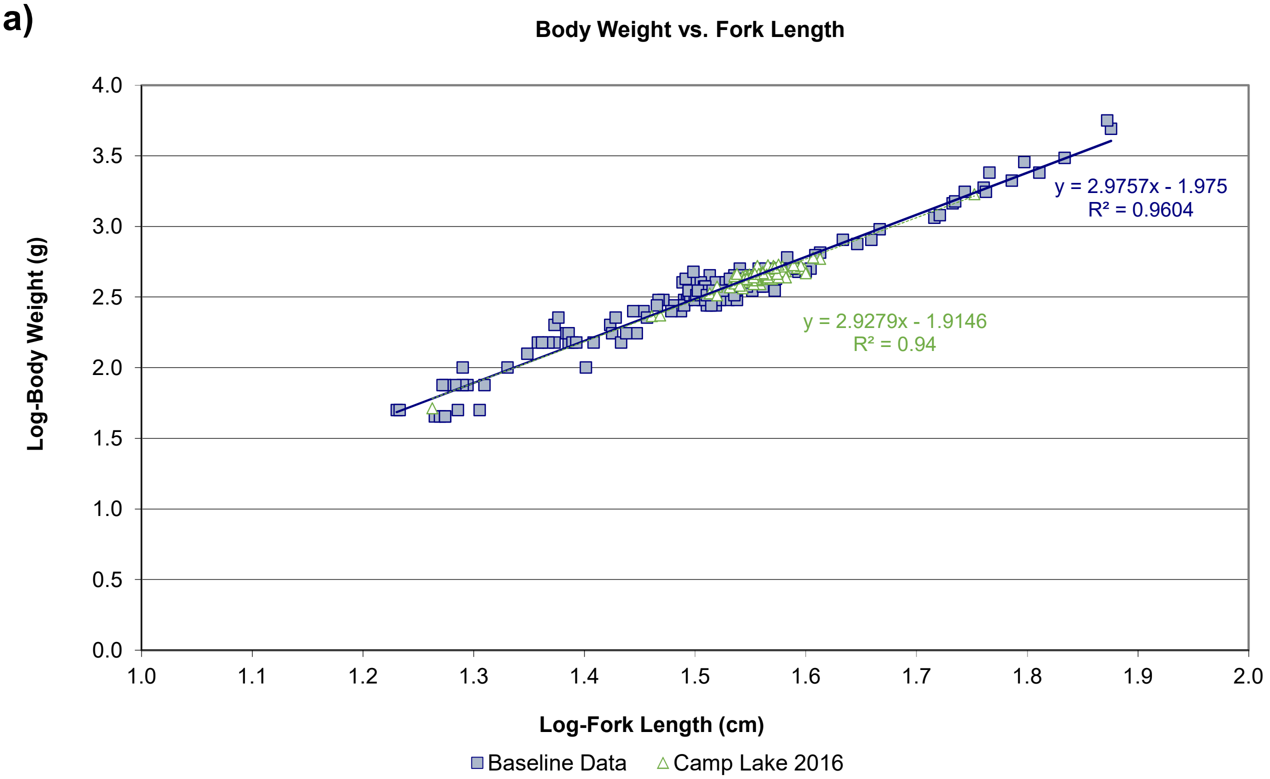


Figure G.4: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected in fall (August-September) at Camp Lake nearshore areas in 2016 and during the mine baseline period (2013) using log-transformed (a) and untransformed (b) data, Mary River Project CREMP.

a)



b)

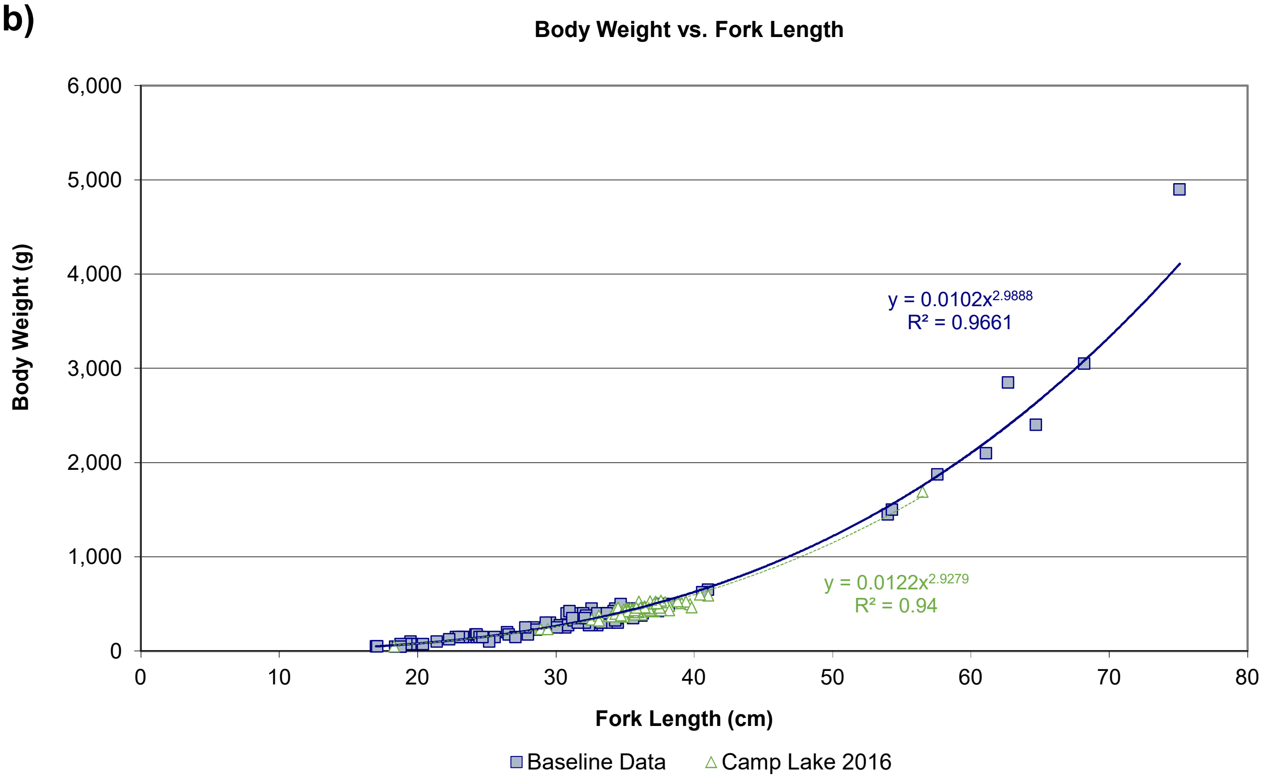


Figure G.5: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected in fall (August-September) at Camp Lake littoral/profundal areas in 2016 and during the mine baseline period (2006, 2007, 2008, 2013) using log-transformed (a) and untransformed (b) data, Mary River Project CREMP.

a)

b)

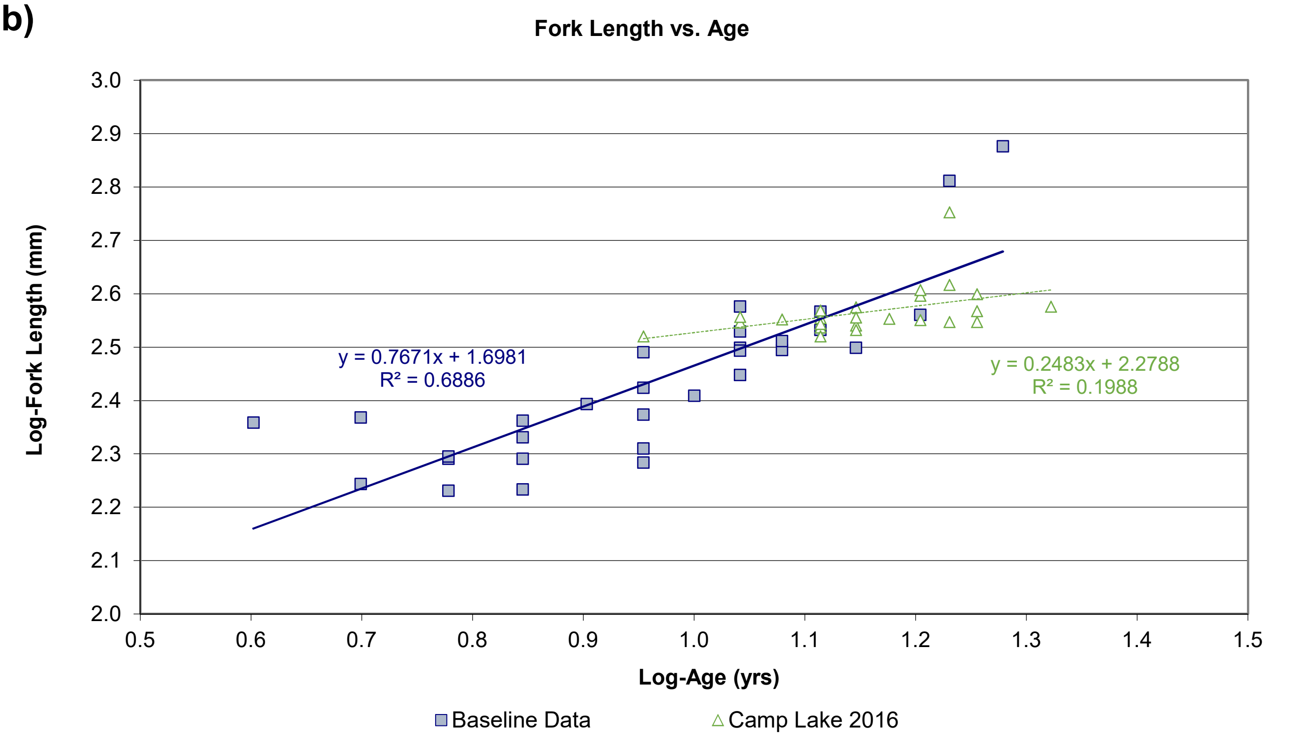
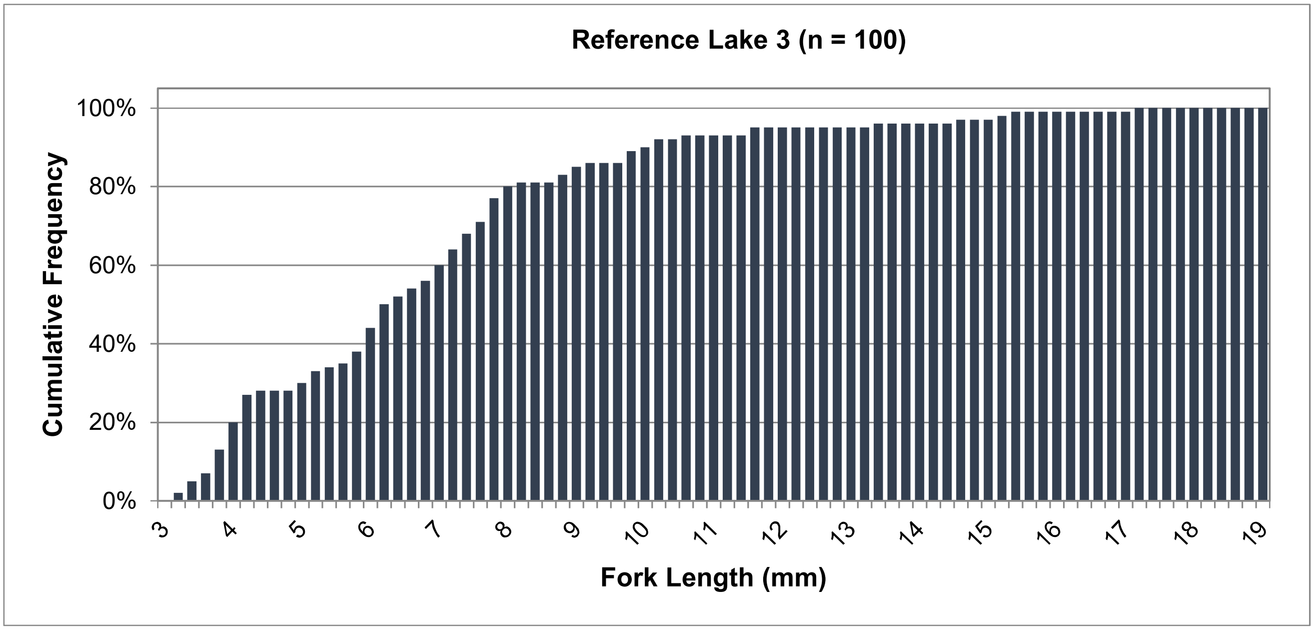


Figure G.6: Weight-at-age (a) and length-at-age (b) growth relationships for Arctic charr collected in fall (August-September) at Camp Lake nearshore areas in 2016 and during the baseline period (2006, 2007, 2013), Mary River Project CREMP.



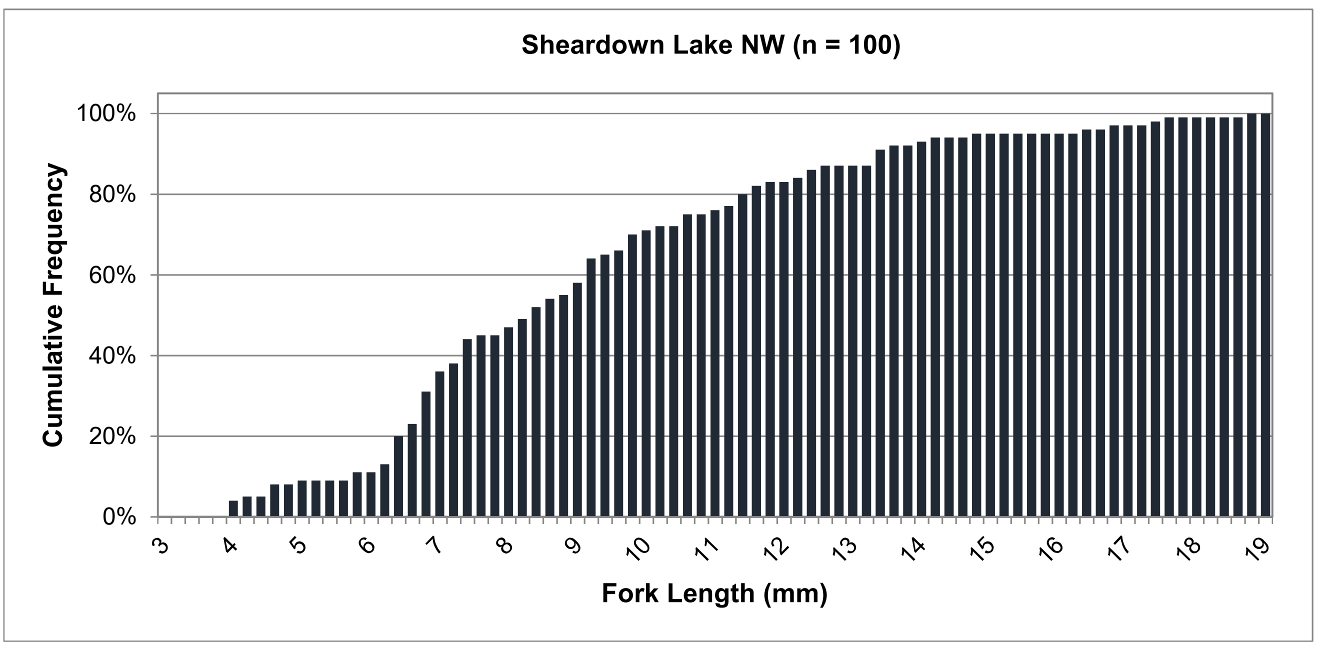


Figure G.7: Cumulative length-frequency distributions for juvenile Arctic charr captured by electrofishing at nearshore areas of Sheardown Lake NW and Reference Lake 3, Mary River Project CREMP, August 2016.

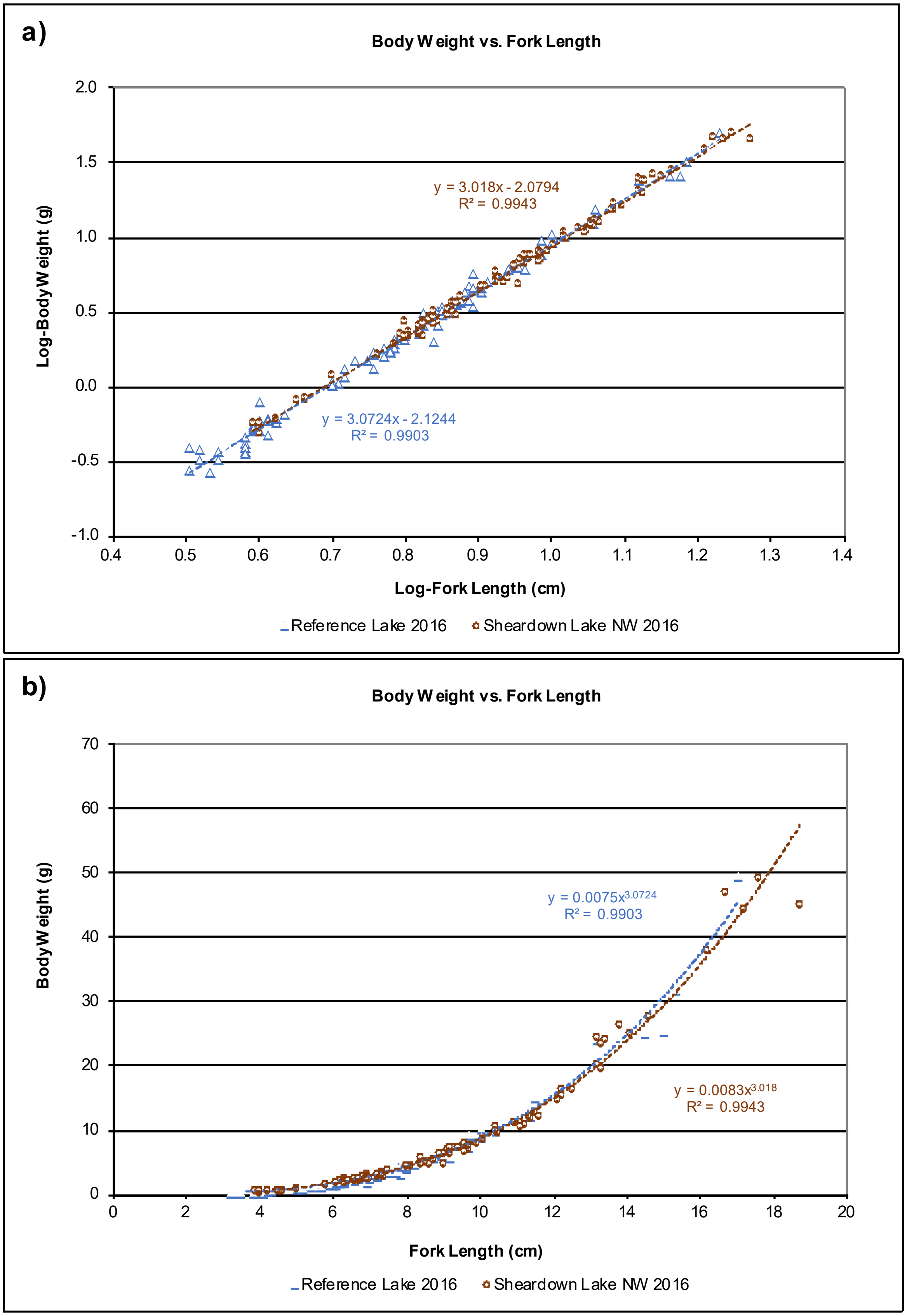
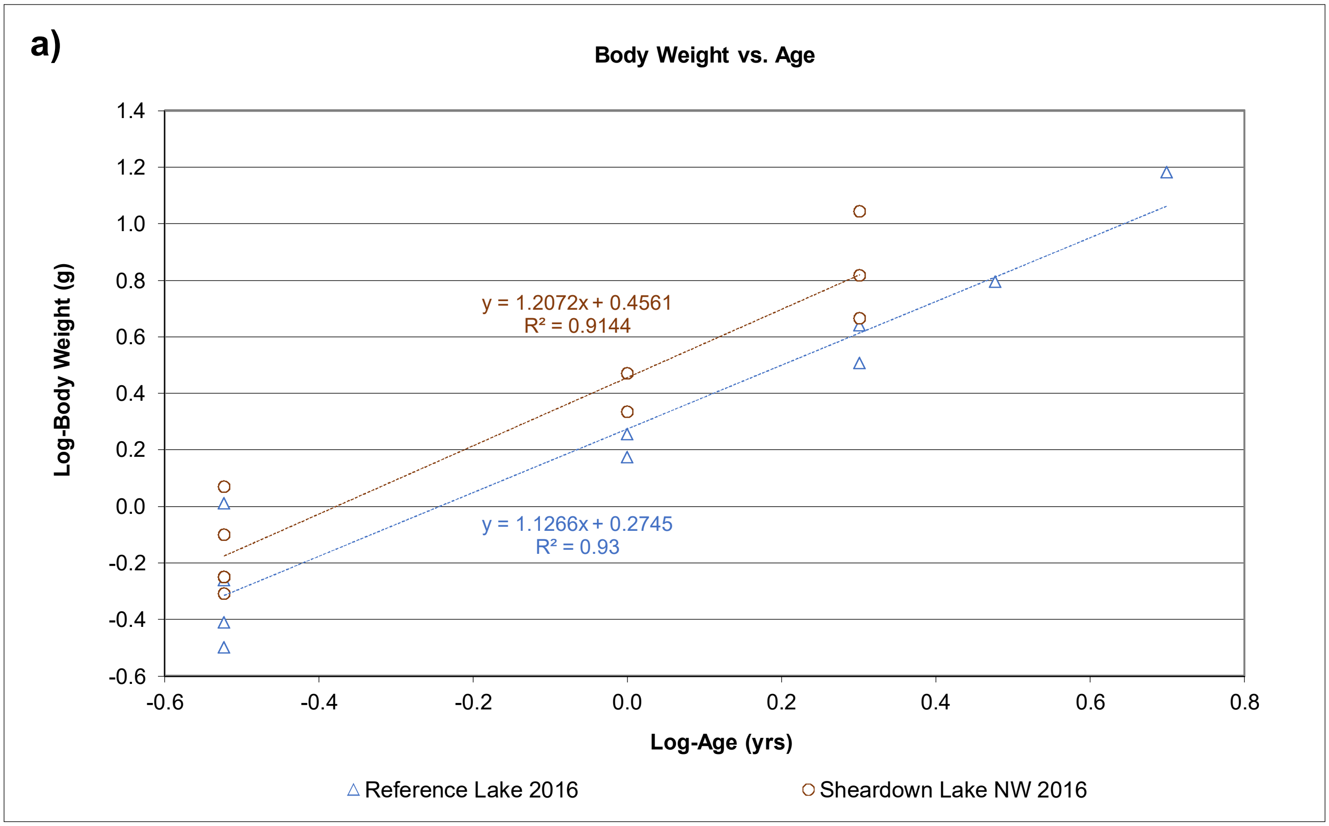


Figure G.8: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected at the nearshore area of Sheardown Lake NW and Reference Lake 3 in August 2016 using log-transformed (a) and untransformed (b) data, Mary River Project CREMP, 2016.



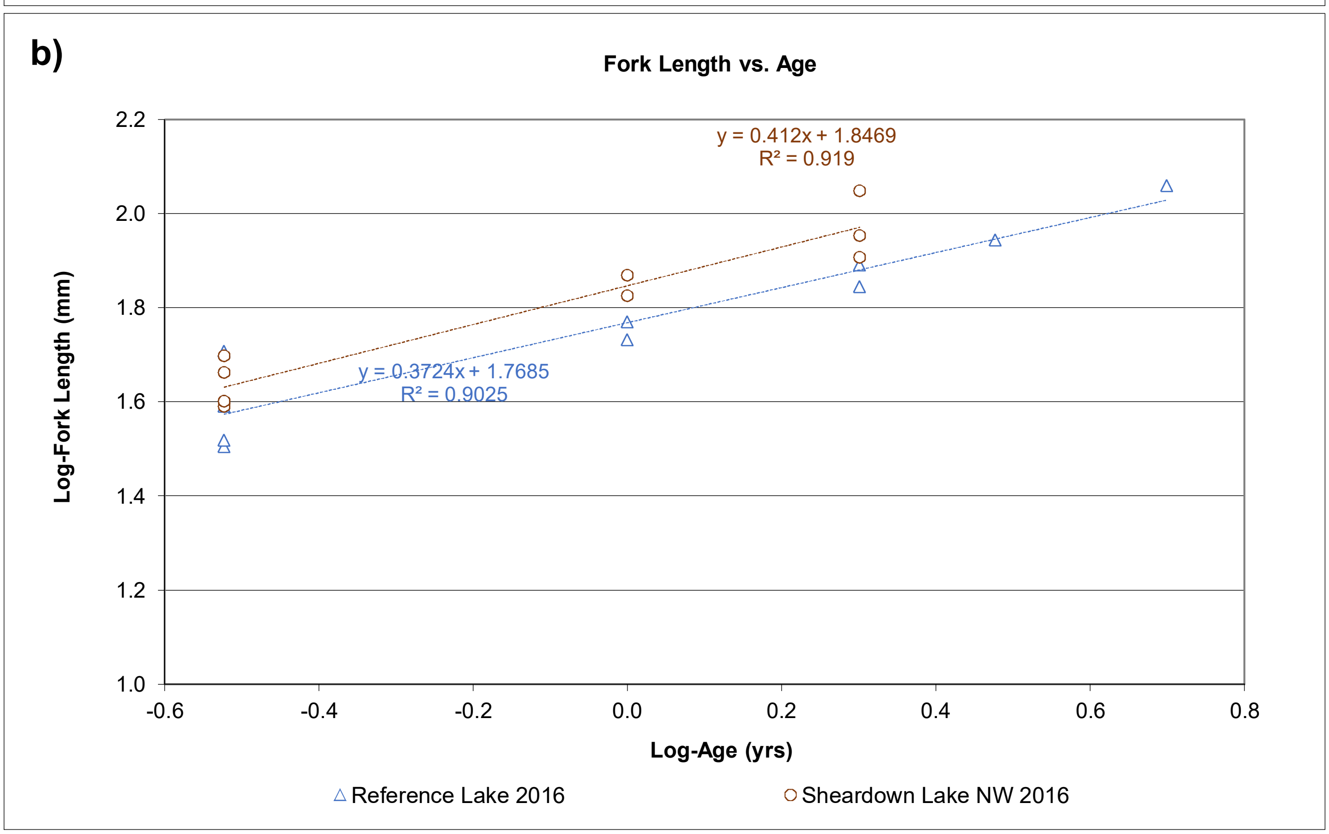


Figure G.9: Weight-at-age (a) and length-at-age (b) growth relationships for Arctic charr collected at the nearshore area of Sheardown Lake NW and Reference Lake 3, Mary River Project CREMP, August 2016.

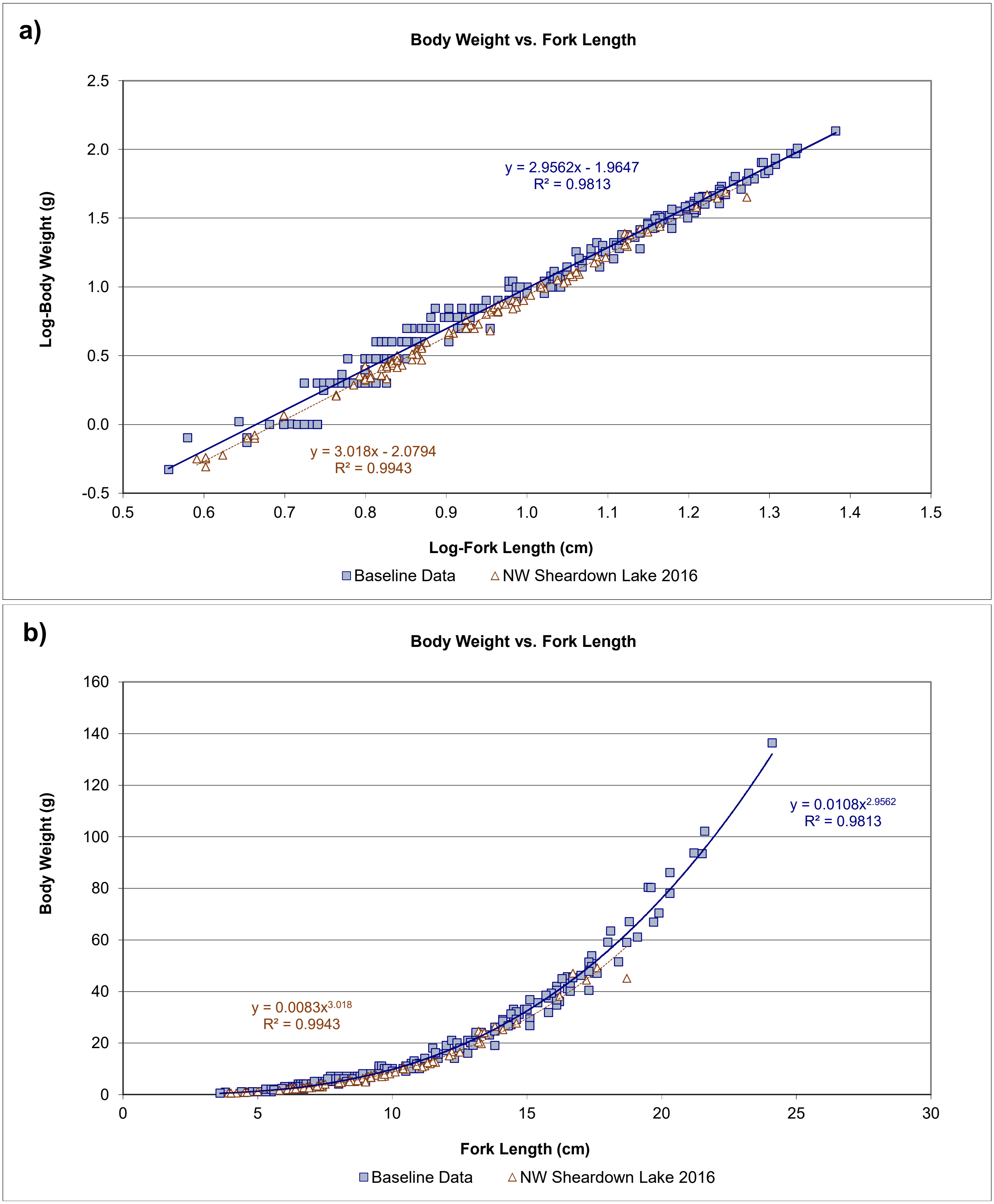


Figure G.10: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected in fall (August-September) at Sheardown Lake NW nearshore areas in 2016 and during the mine baseline period (2007, 2008, 2013) using log-transformed (a) and untransformed (b) data, Mary River Project CREMP.

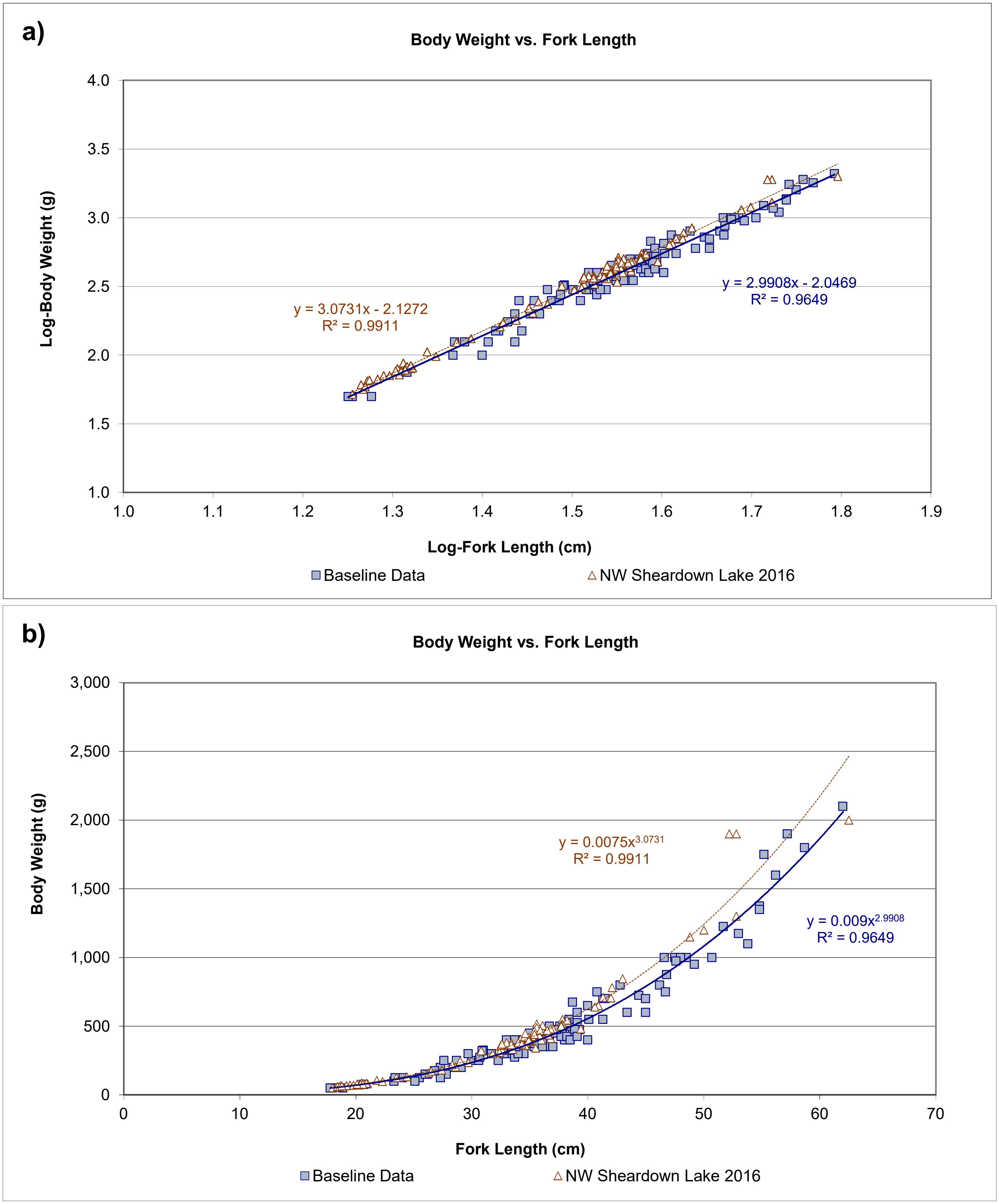
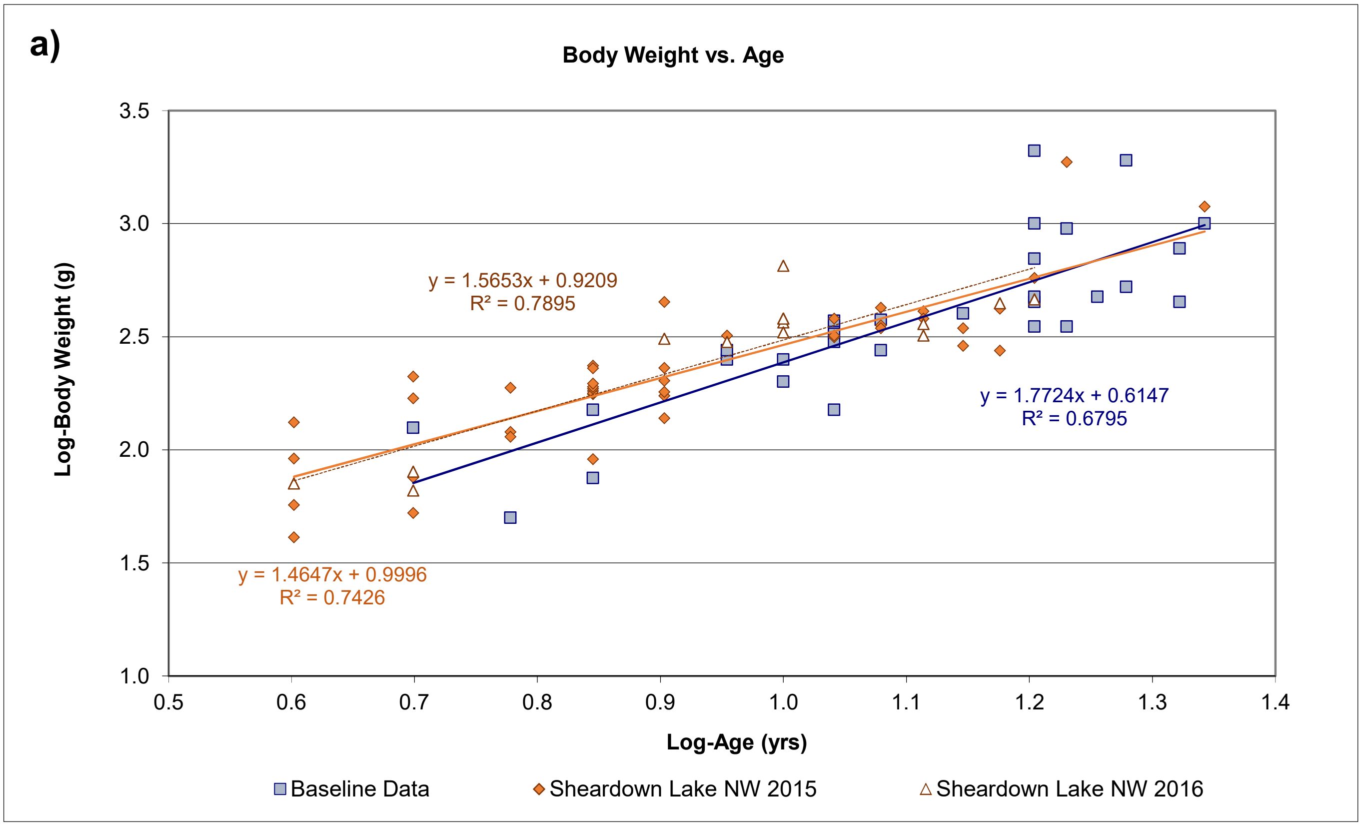


Figure G.11: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected in fall (August-September) at Sheardown Lake NW nearshore areas in 2016 and during the mine baseline period (2006, 2007, 2008, 2013) using log-transformed (a) and untransformed (b) data, Mary River Project CREMP.



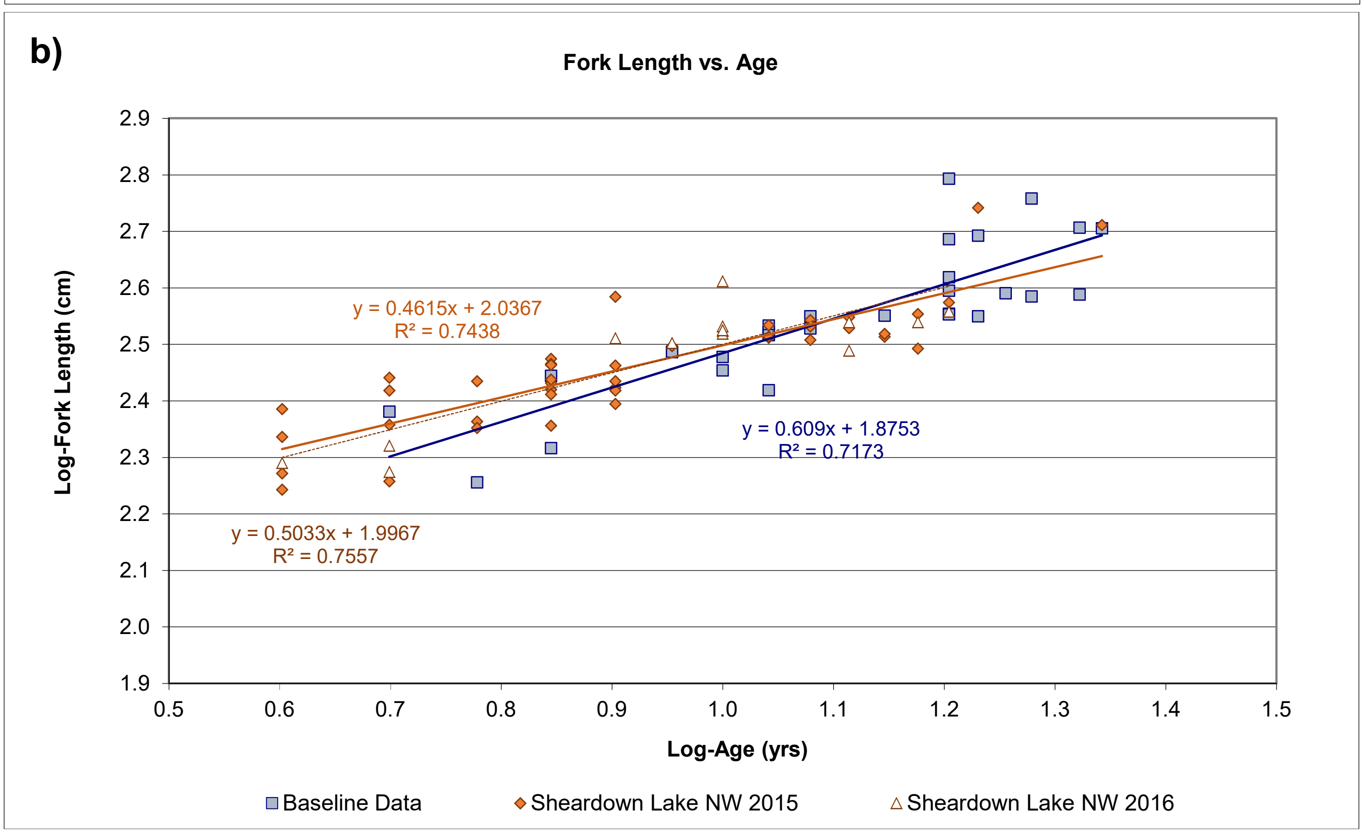
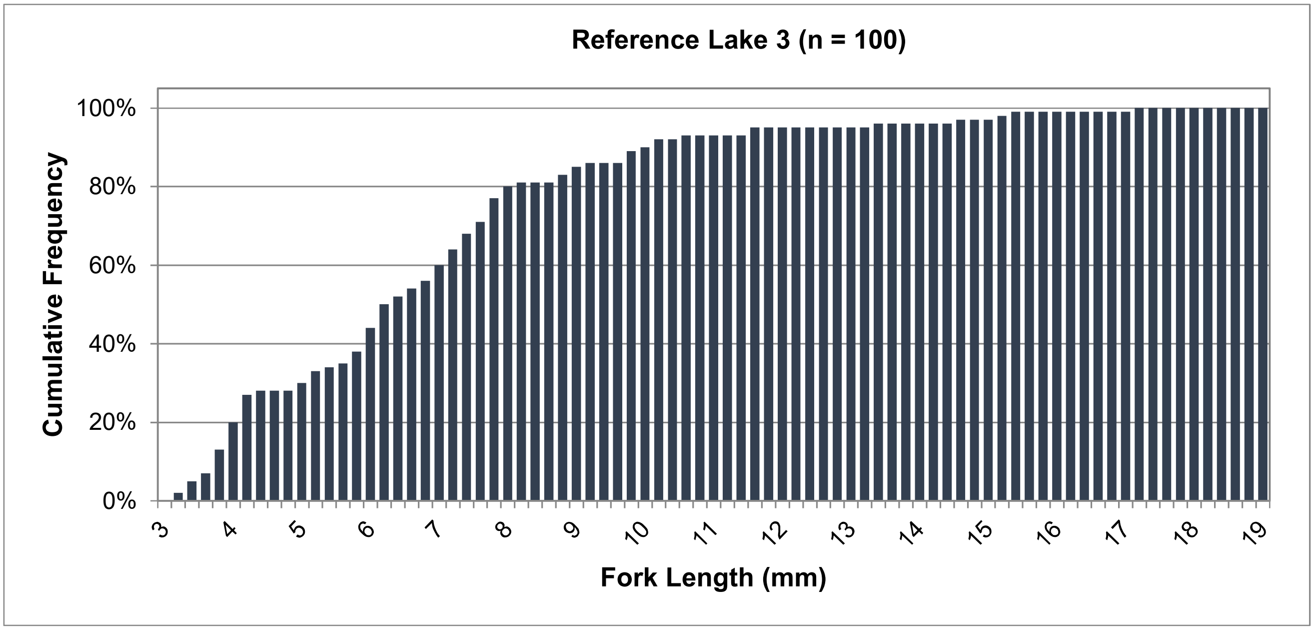


Figure G.12: Weight-at-age (a) and length-at-age (b) growth relationships for Arctic charr collected in fall (August-September) at Sheardown Lake NW nearshore areas in 2016, 2015 and over the baseline period (2006, 2007, 2013), Mary River Project CREMP.



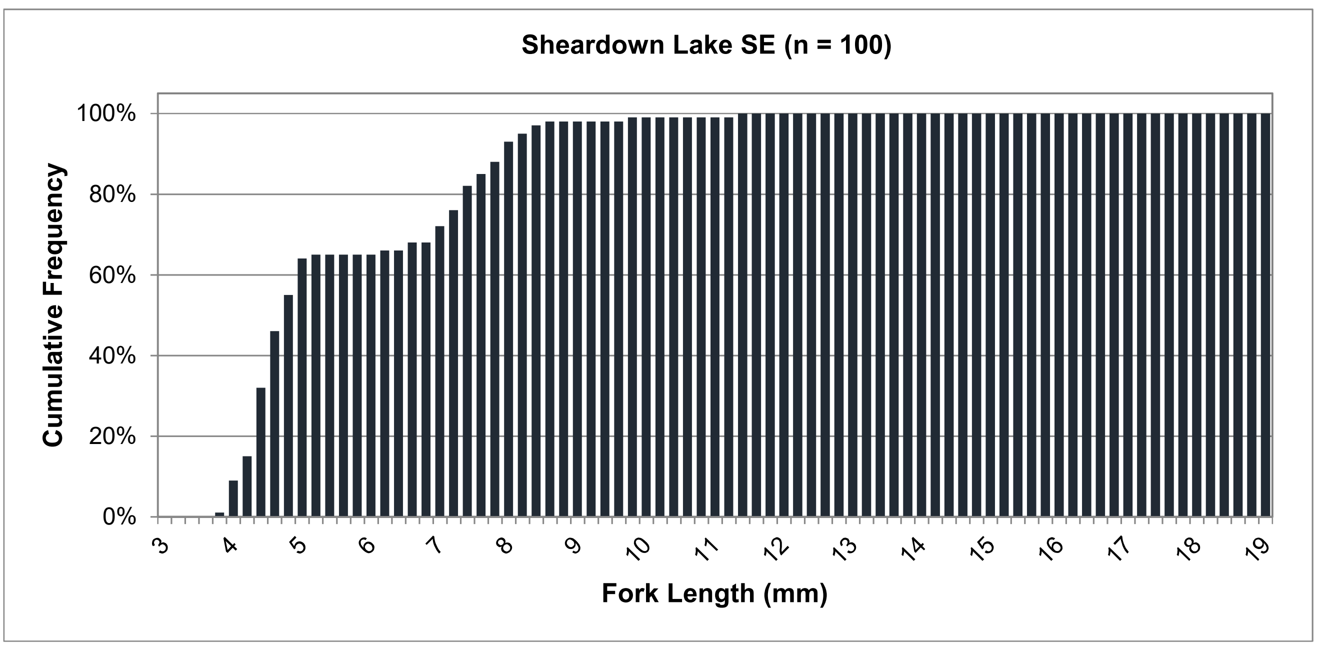


Figure G.13: Cumulative length-frequency distributions for juvenile Arctic charr captured by electrofishing at nearshore areas of Sheardown Lake SE and Reference Lake 3, Mary River Project CREMP, August 2016.

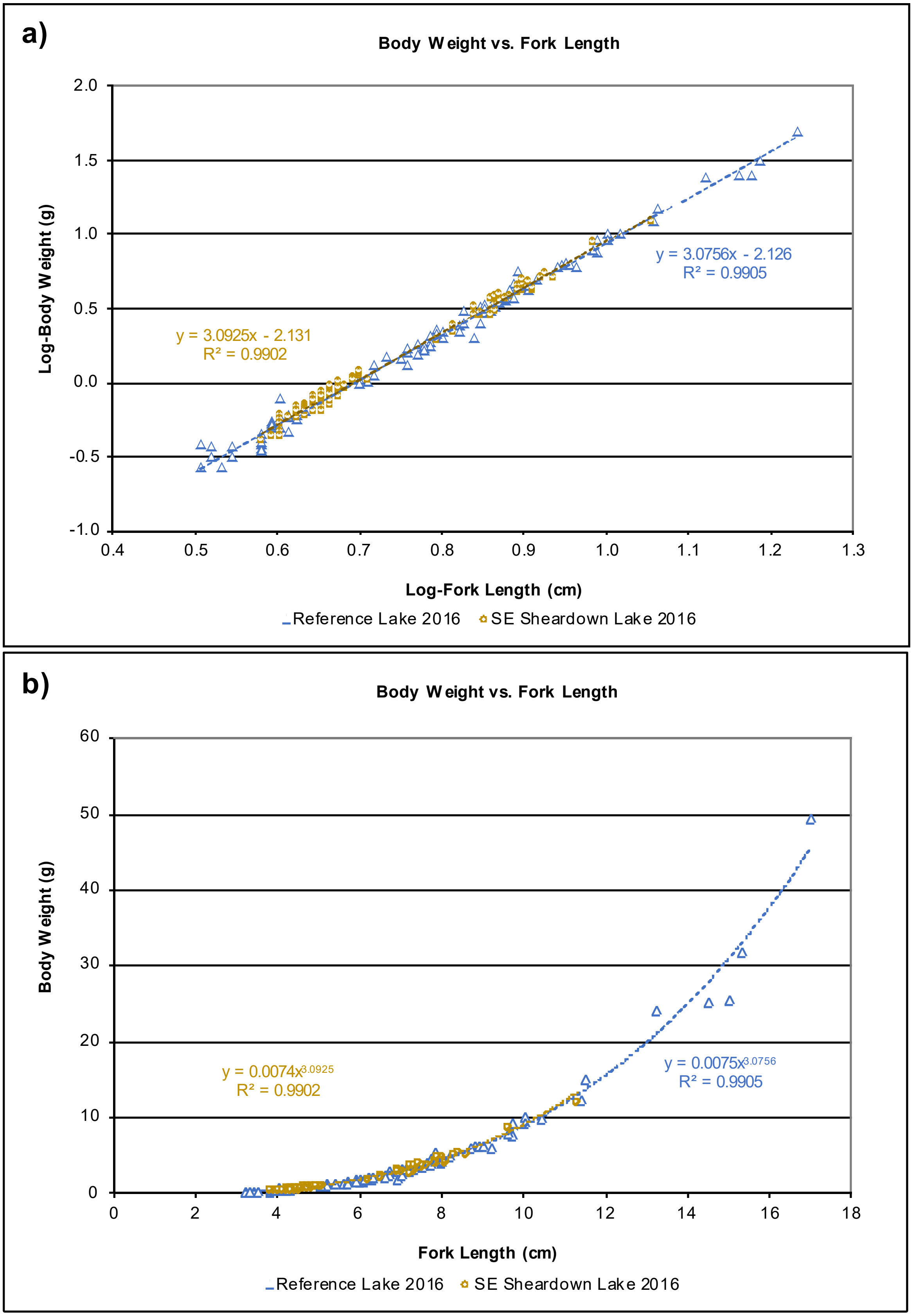


Figure G.14: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected at the nearshore area of Sheardown Lake SE and Reference Lake 3 in August 2016 using log-transformed (a) and untransformed (b) data, Mary River Project CREMP, 2016.

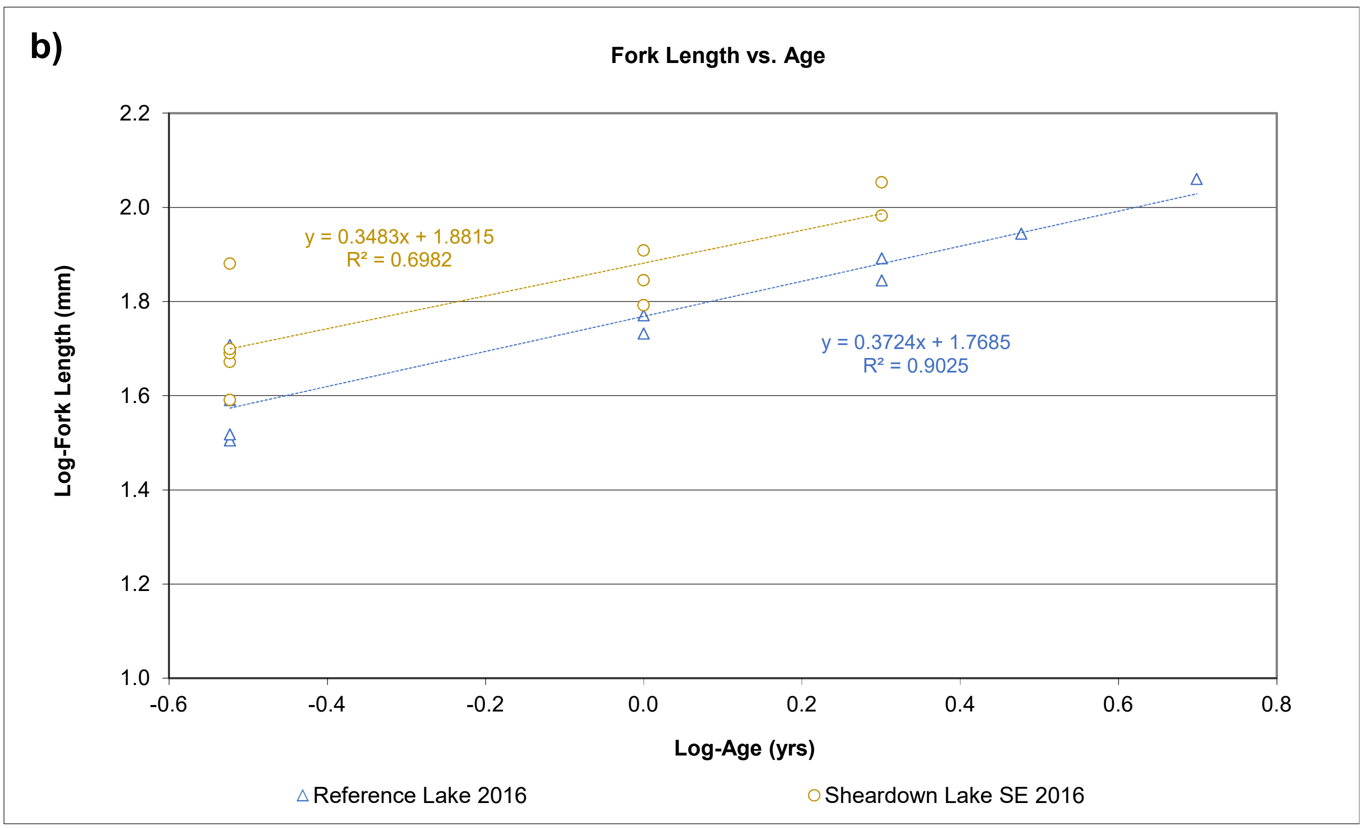
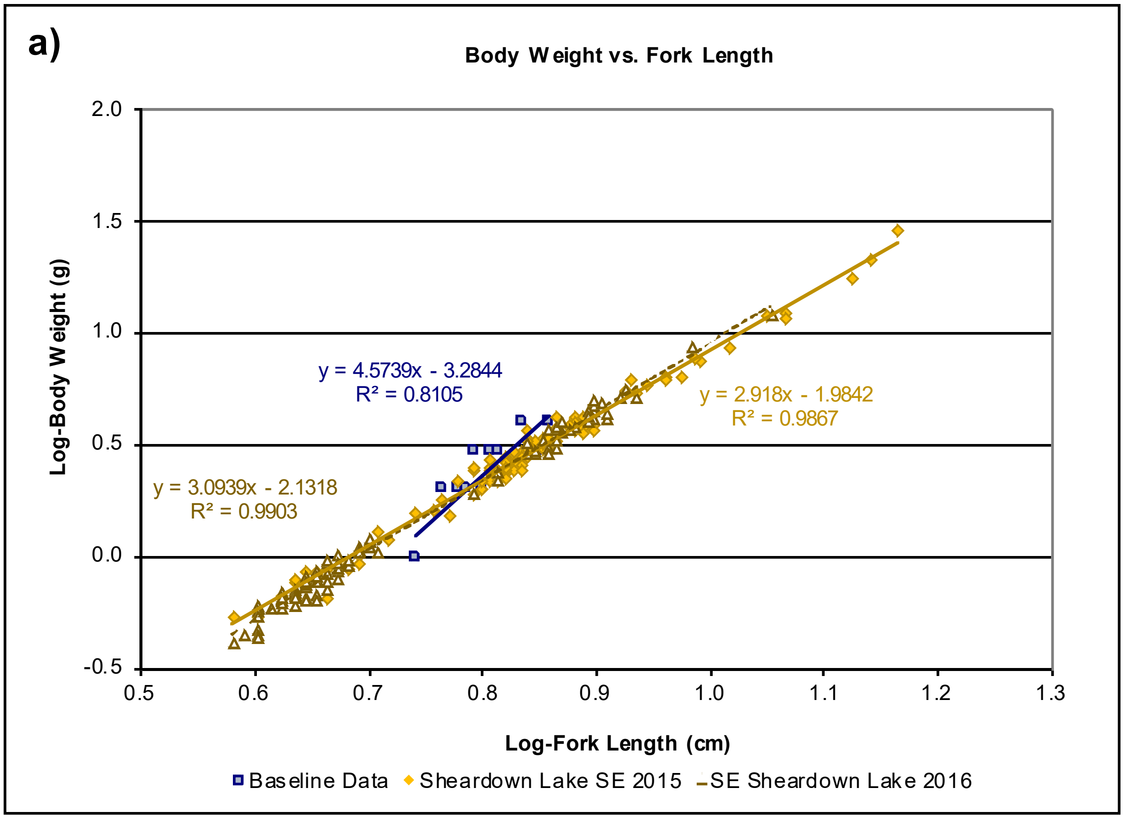


Figure G.15: Weight-at-age (a) and length-at-age (b) growth relationships for Arctic charr collected at the nearshore area of Sheardown Lake SE and Reference Lake 3, Mary River Project CREMP, August 2016.



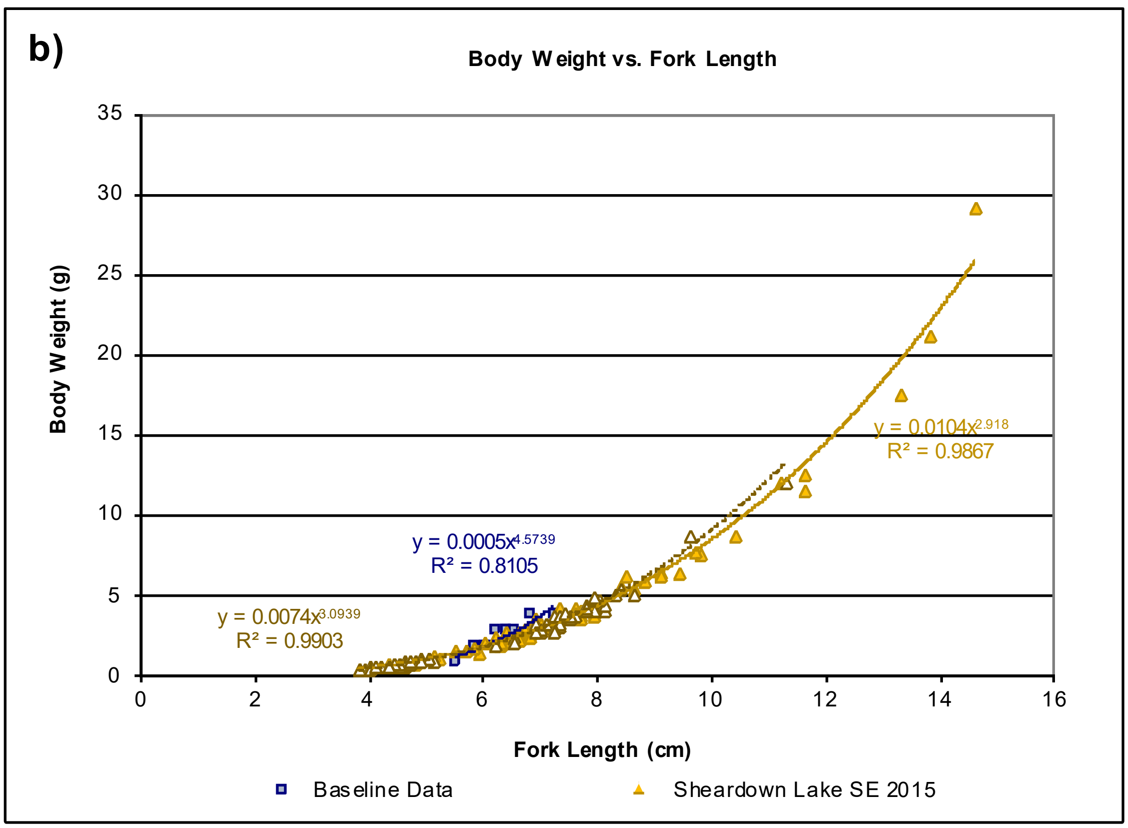
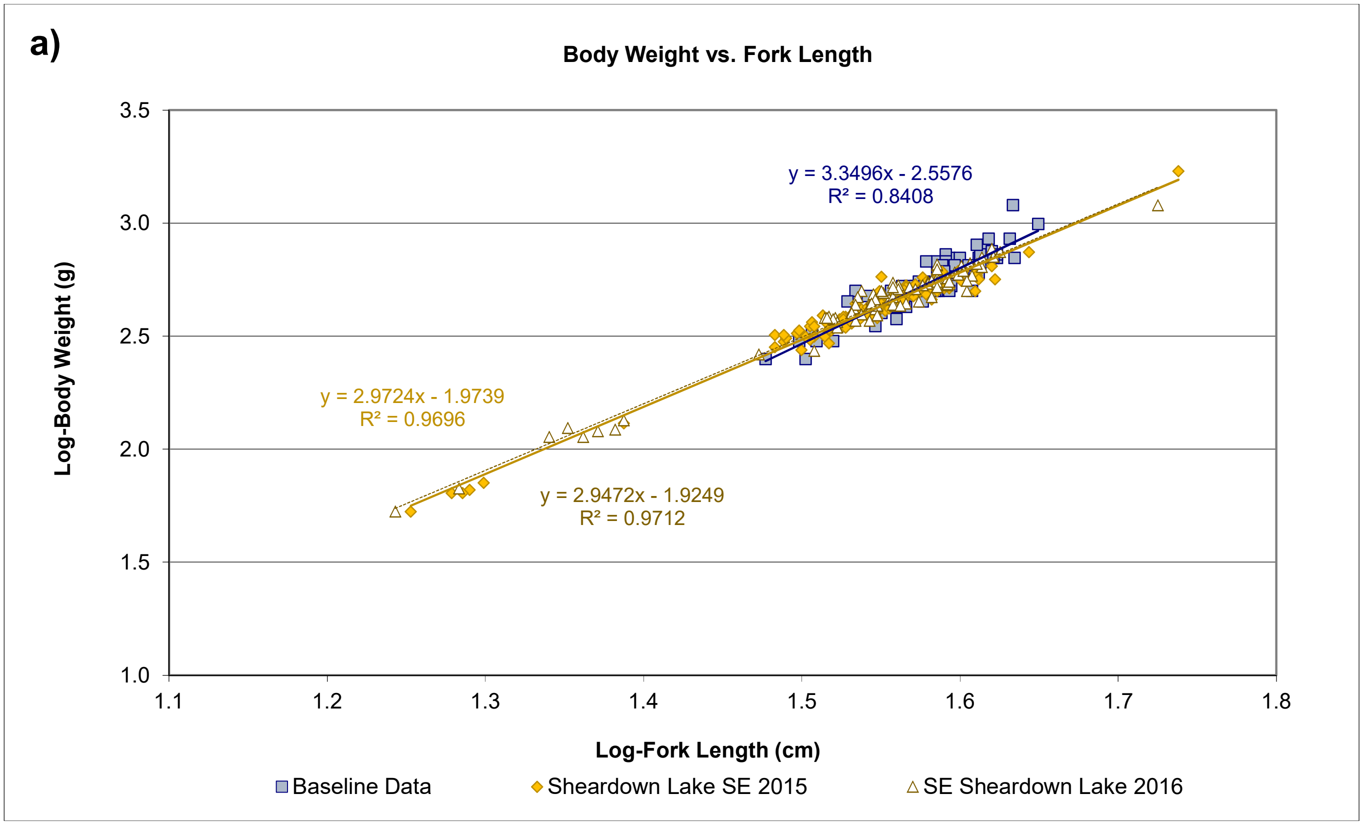


Figure G.16: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected in fall (August-September) at Sheardown Lake SE nearshore areas in 2016, 2015 and over the mine baseline period (2007) using log-transformed (a) and untransformed (b) data, Mary River Project CREMP.



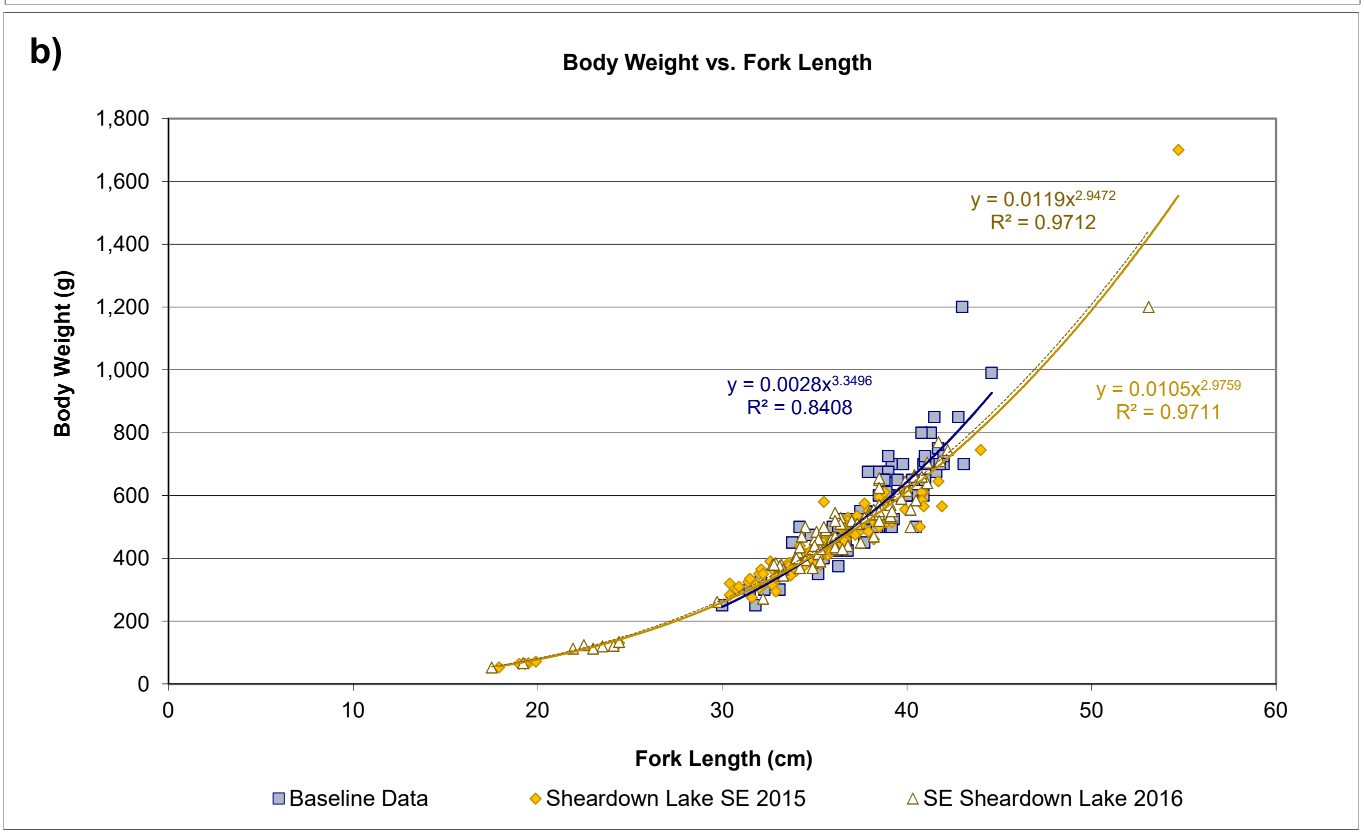
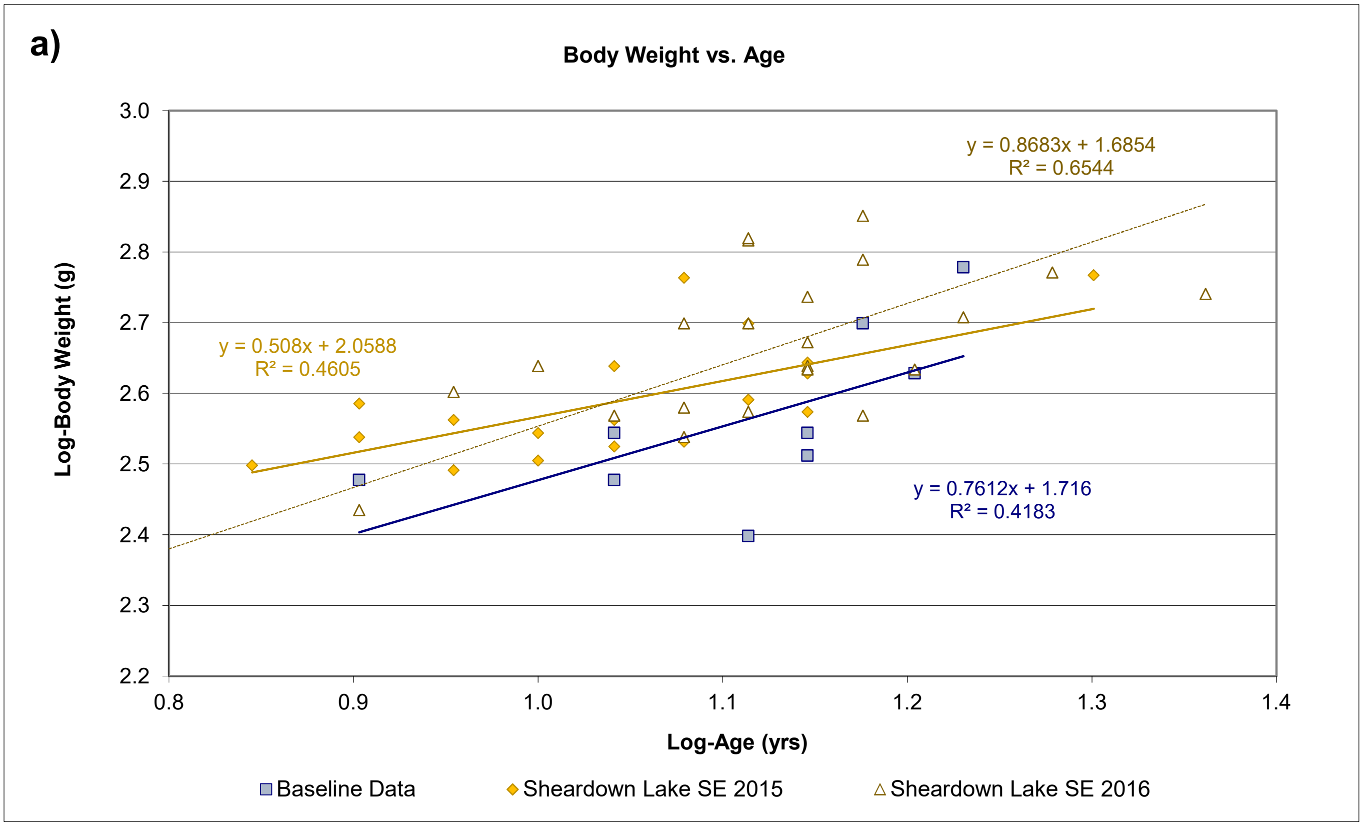


Figure G.17: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected in fall (August-September) at Sheardown Lake SE nearshore areas in 2016, 2015 and during the mine baseline period (2007, 2008) using log-transformed (a) and untransformed (b) data, Mary River Project CREMP.



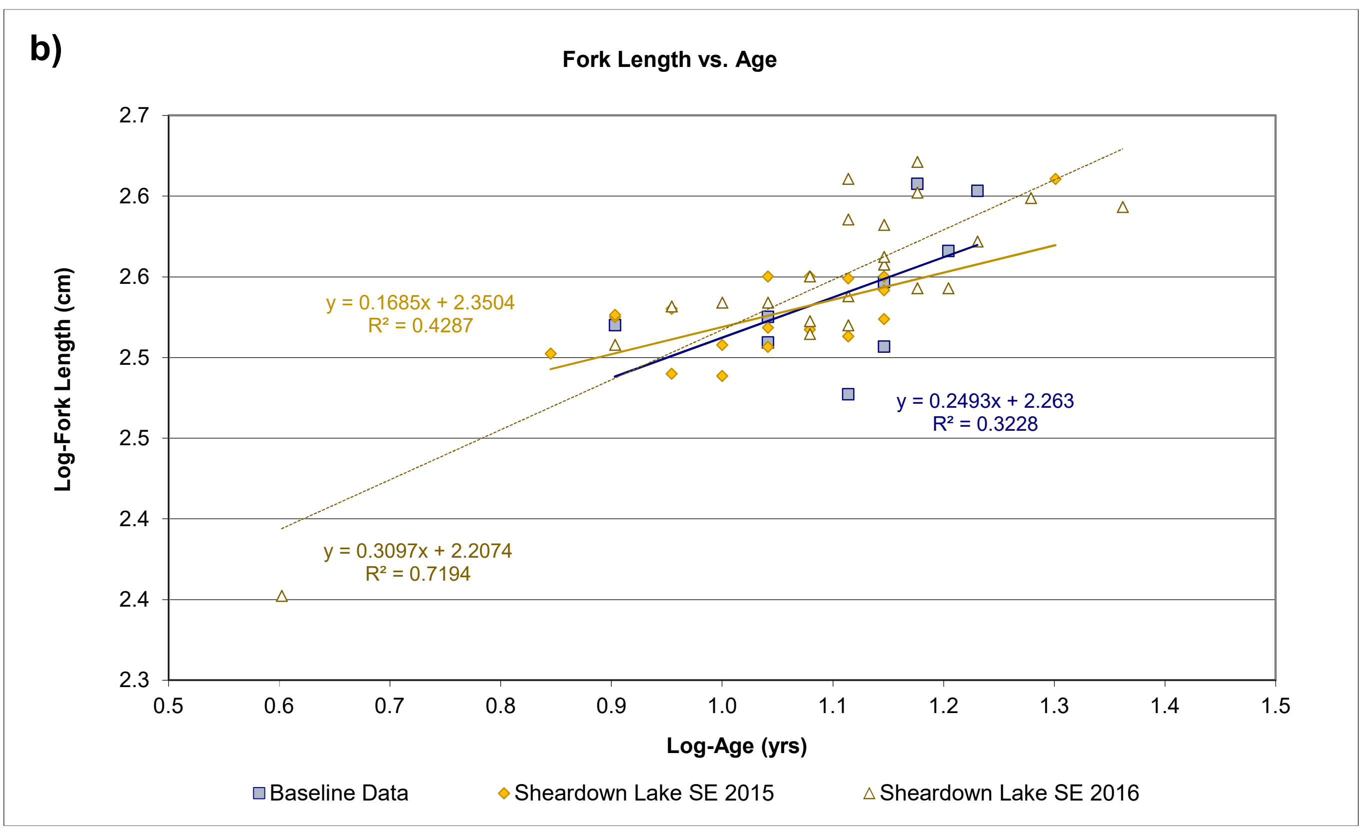
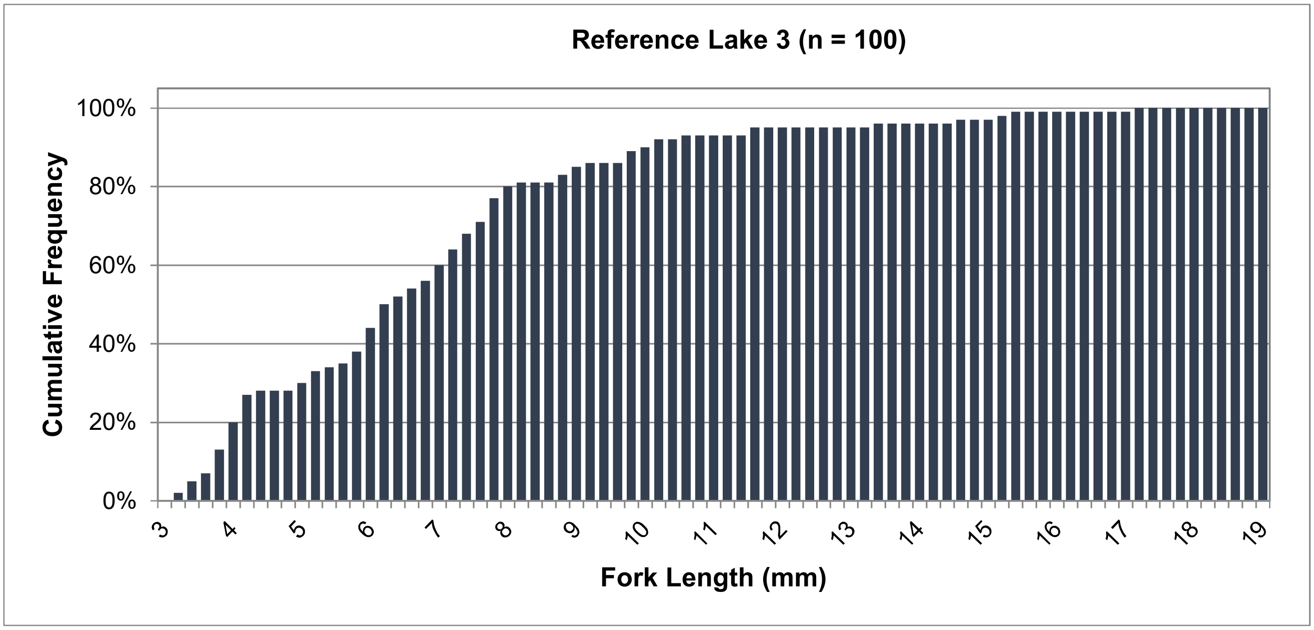


Figure G.18: Weight-at-age (a) and length-at-age (b) growth relationships for Arctic charr collected in fall (August-September) at Sheardown Lake SE nearshore areas in 2016, 2015 and during the baseline period (2007), Mary River Project CREMP.



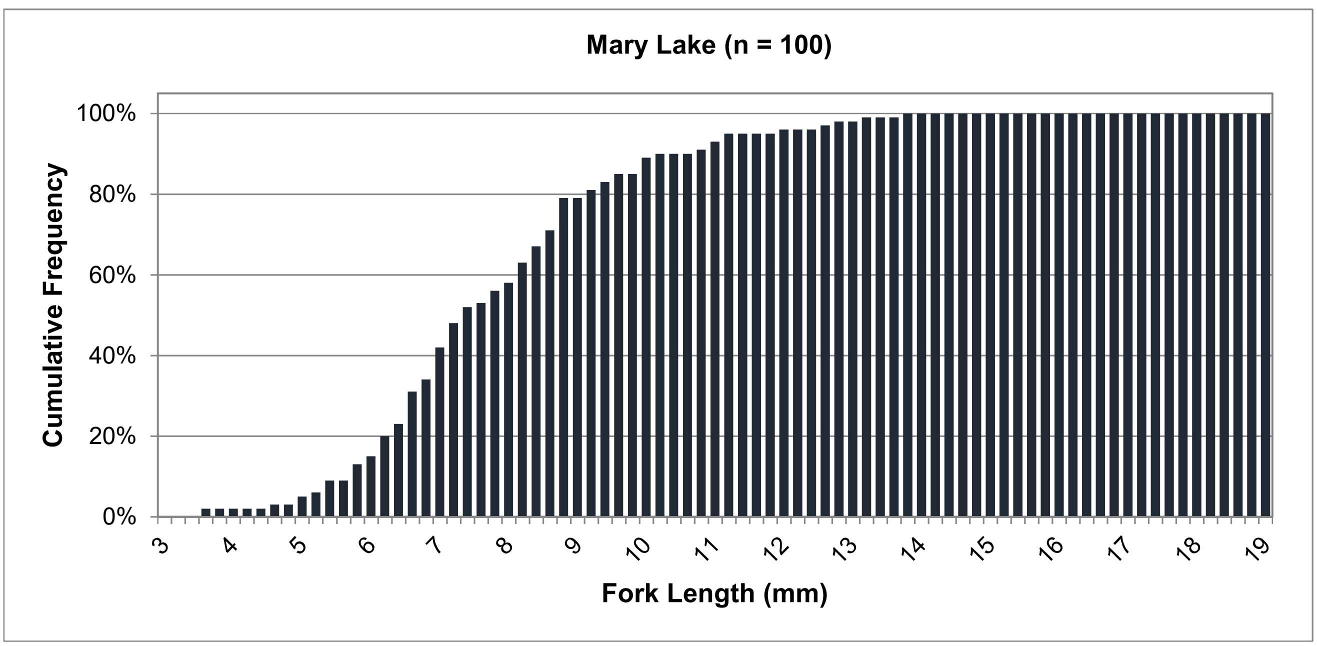


Figure G.19: Cumulative length-frequency distributions for juvenile Arctic charr captured by electrofishing at nearshore areas of Mary Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

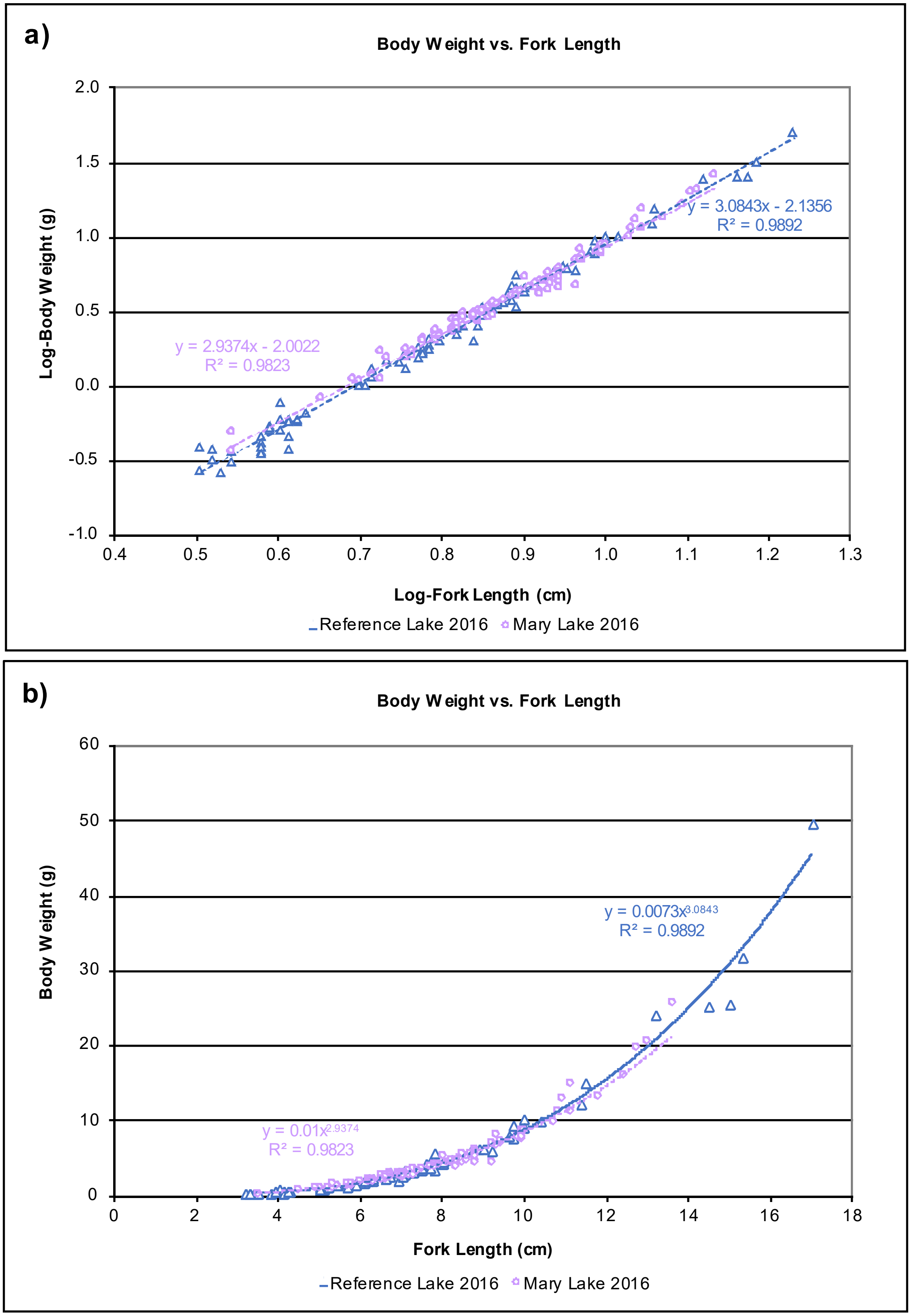
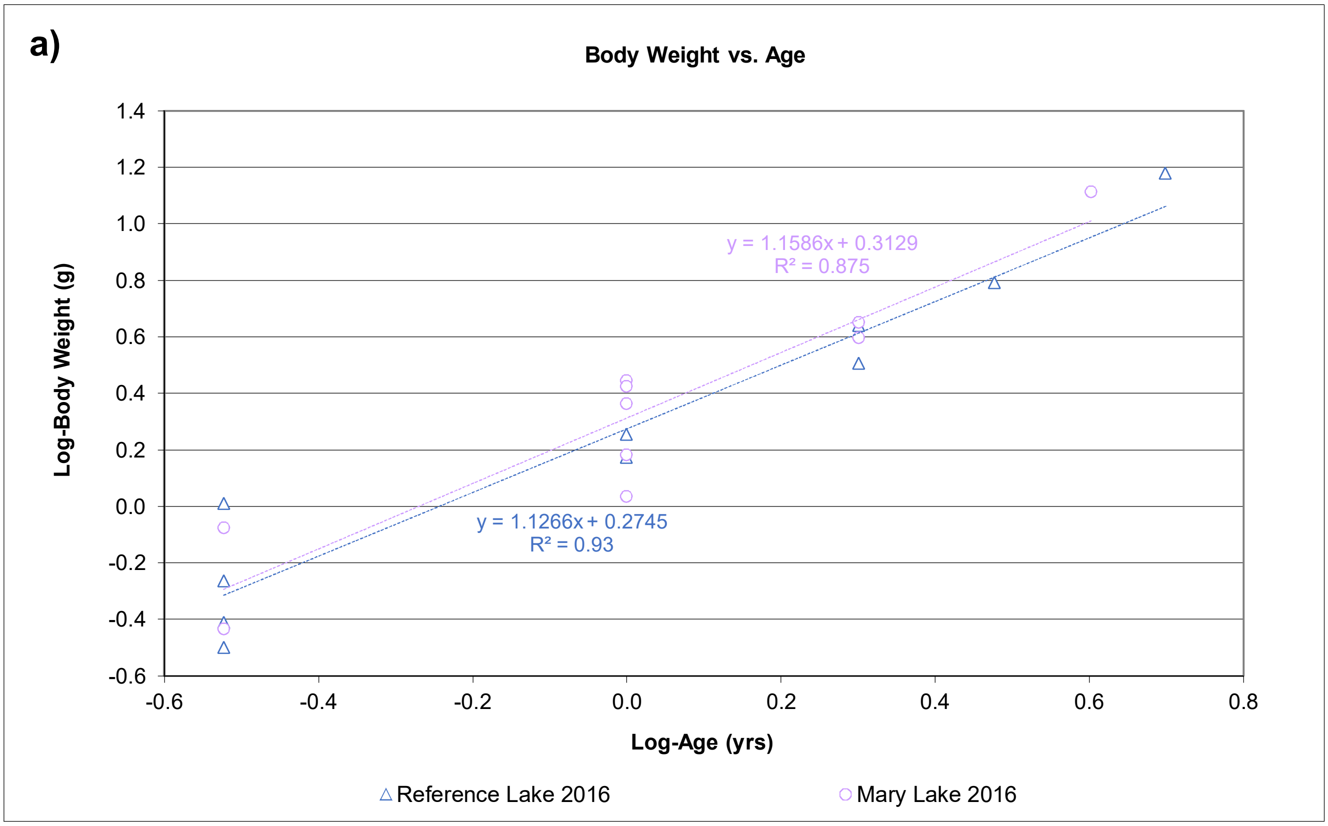


Figure G.20: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected at the nearshore area of Mary Lake and Reference Lake 3 in August 2016 using log-transformed (a) and untransformed (b) data, Mary River Project CREMP, 2016.



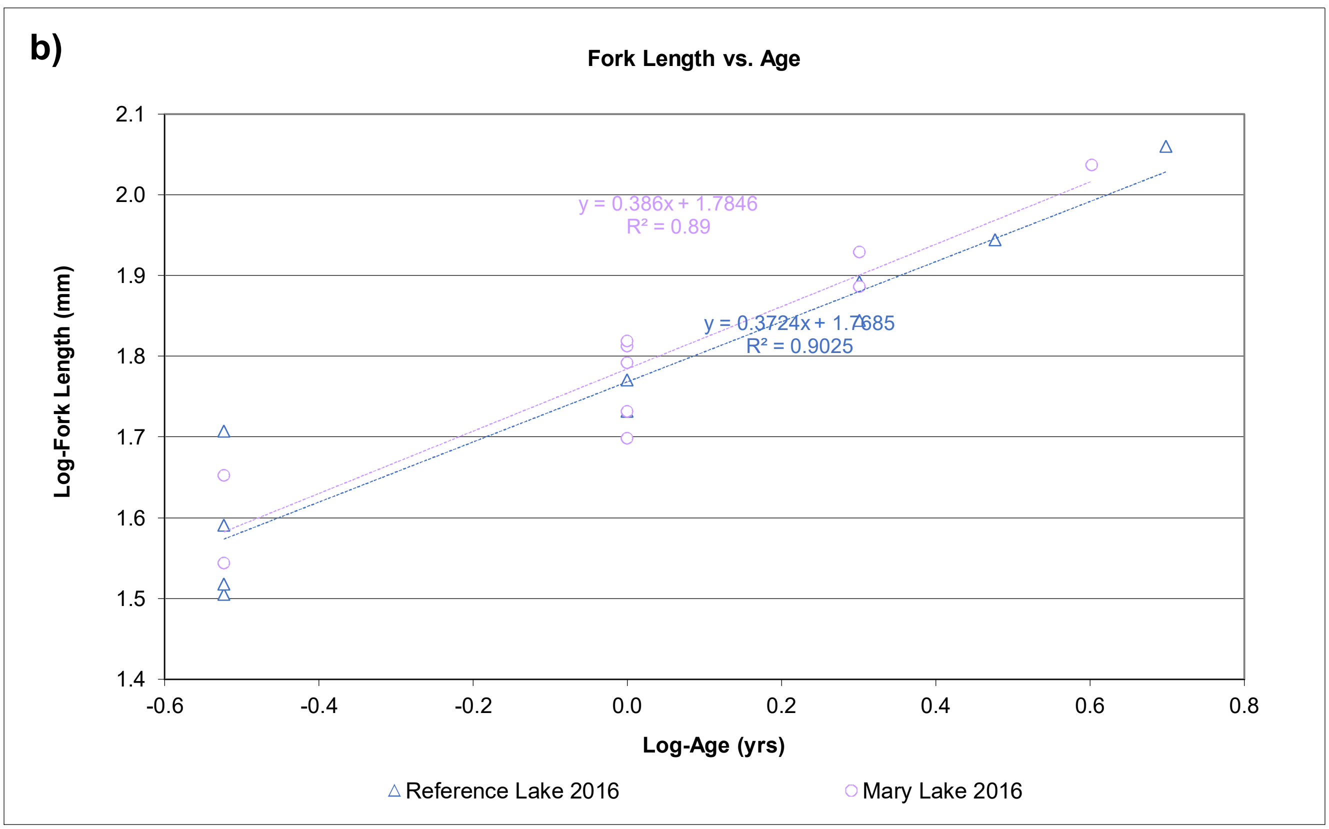


Figure G.21: Weight-at-age (a) and length-at-age (b) growth relationships for Arctic charr collected at the nearshore area of Mary Lake and Reference Lake 3, Mary River Project CREMP, August 2016.

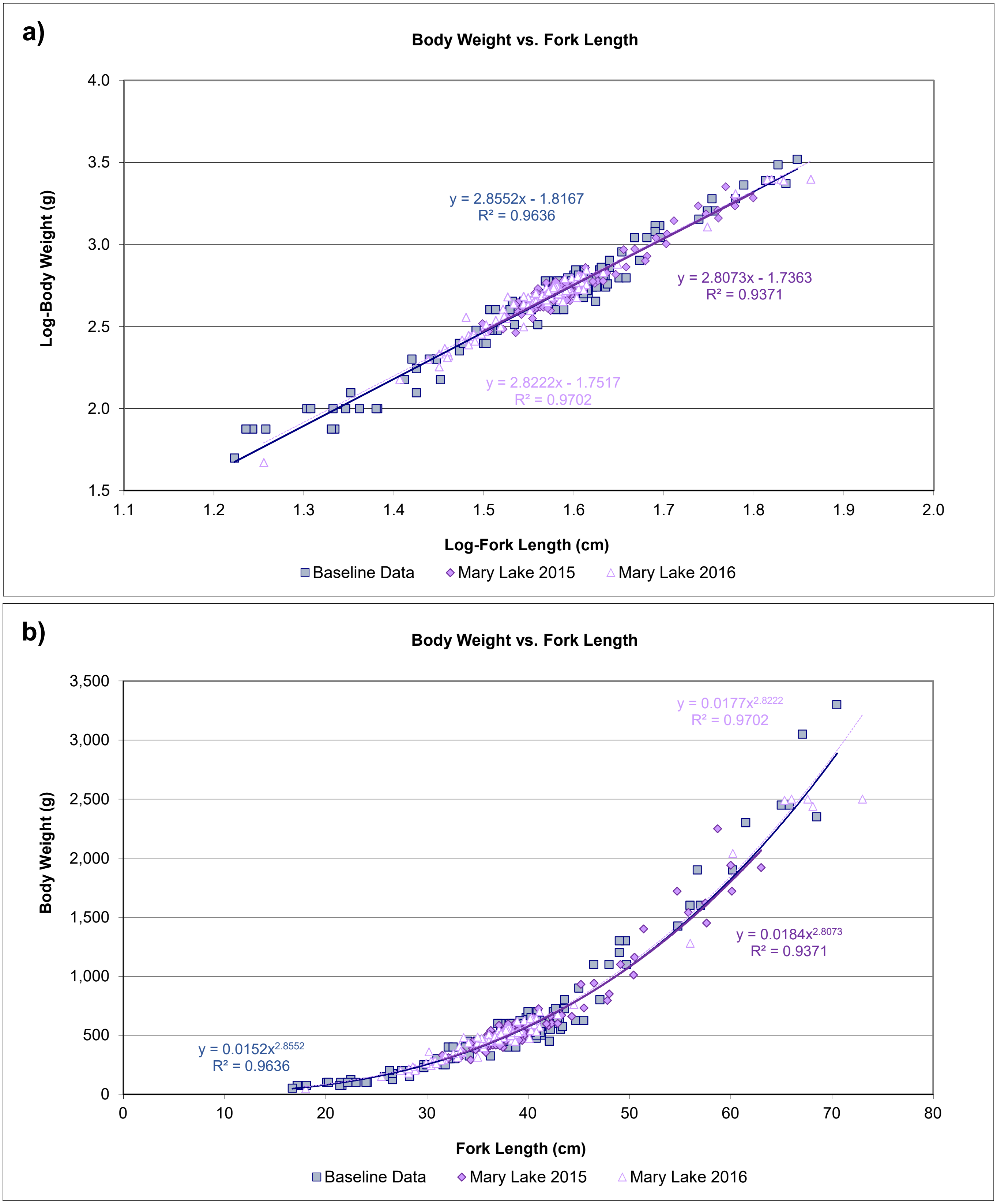
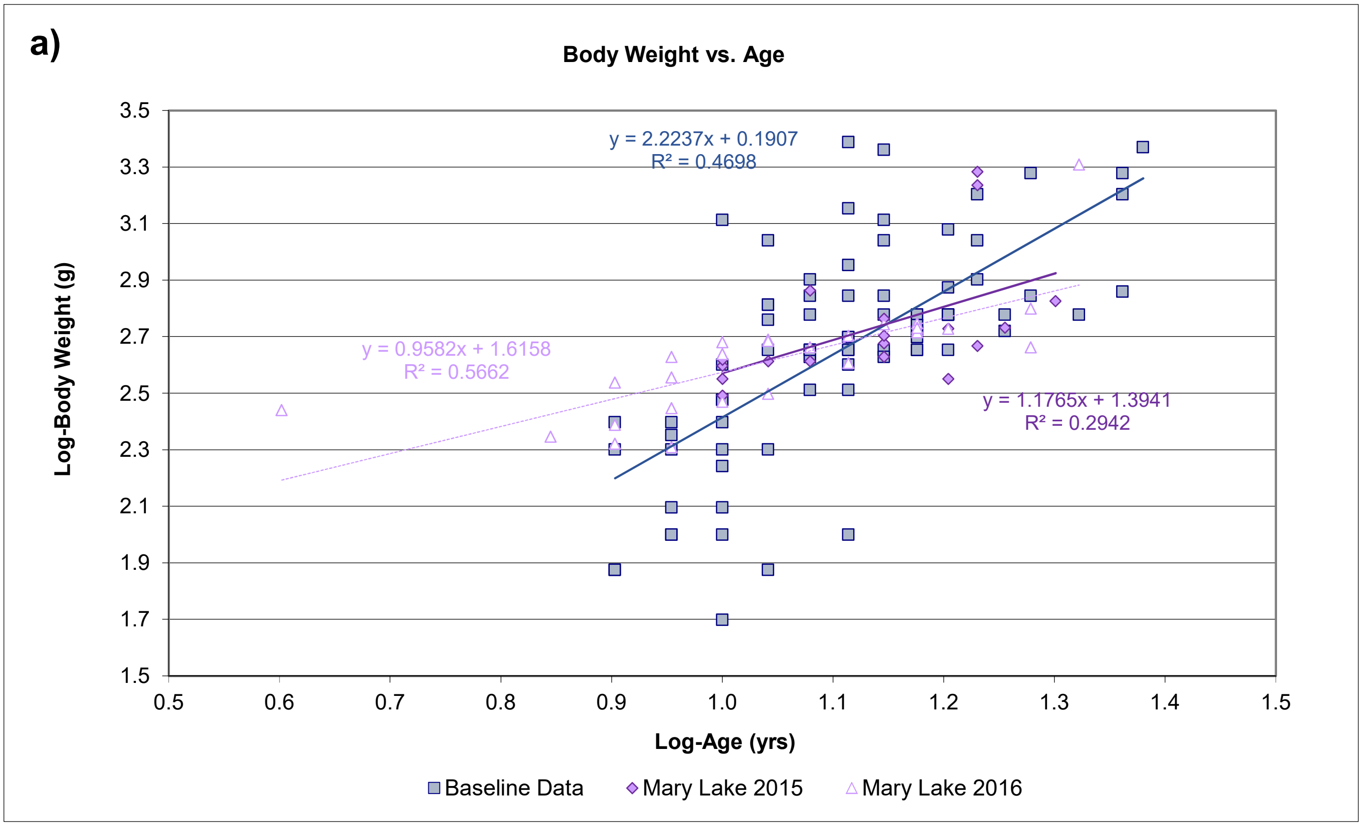


Figure G.22: Comparison of condition (weight-at-fork length relationship) for Arctic charr collected in fall (August-September) at Mary Lake nearshore areas in 2016, 2015 and during the mine baseline period (2006, 2007) using log-transformed (a) and untransformed (b) data, Mary River Project CREMP.



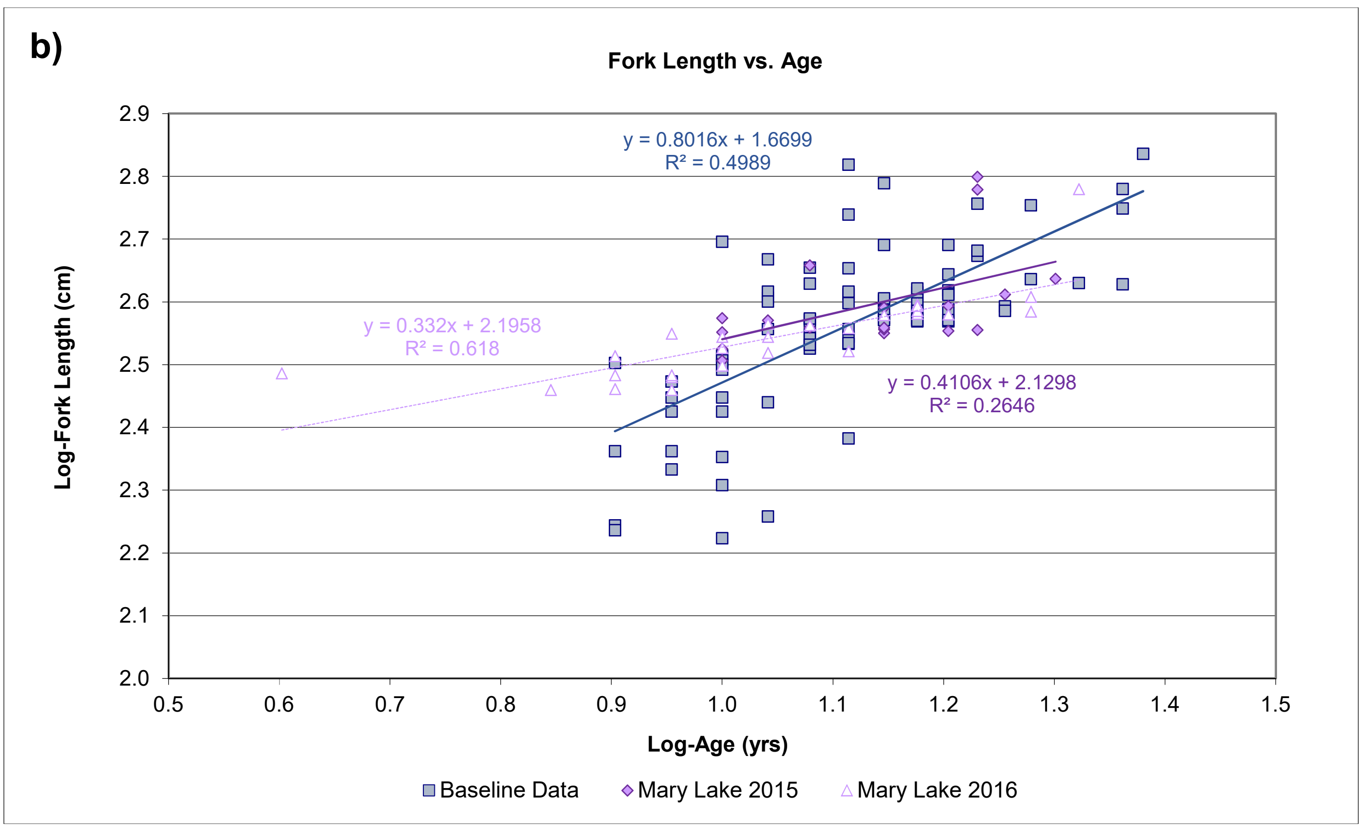


Figure G.23: Weight-at-age (a) and length-at-age (b) growth relationships for Arctic charr collected in fall (August-September) at Mary Lake nearshore areas in 2016, 2015 and during the baseline period (2006, 2007), Mary River Project CREMP.

APPENDIX D.9.2

2016 LAKE SEDIMENTATION MONITORING PROGRAM

Mary River Project 2015 - 2016
Lake Sedimentation Monitoring Report

Prepared For:
Baffinland Iron Mines Corporation
Mary River Project
Oakville, ON

Prepared By:
Minnow Environmental Inc.
Georgetown, ON

March 2017

Mary River Project 2015 - 2016
Lake Sedimentation
Monitoring Report

Prepared for:

Baffinland Iron Mines Corp.
Mary River Project

Prepared by:
Minnow Environmental Inc.

Paul LePage, M.Sc.
Project Manager

March 2017

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1.0 INTRODUCTION

1.1 Background

The Mary River Project, owned and operated by Baffinland Iron Mines Corporation (Baffinland), is a high-grade iron ore mining operation located in the Qikiqtani Region of northern Baffin Island, Nunavut (Figure 1.1). Construction of mine infrastructure for the initial mining stages at the Mary River Project, referred to as the Early Revenue Phase (ERP), commenced in mid-2013 and is on-going. Surface mining for the ERP commenced in mid-September 2014, and has since included pit bench development, ore haulage and stockpiling, and the crushing and screening of high-grade iron ore at the mine site. The Mary River Project has the potential to result in increased sediment deposition in mine area water bodies through fugitive dust deposition, surface runoff/erosion from the mine site and/or increased biological productivity (i.e., eutrophication due to treated sewage discharge). In aquatic environments, these deposits could lead to physical habitat alteration (e.g., changes in substrate composition) and/or chemical alteration (e.g., changes in metal and/or nutrient concentrations, organic content) that, in turn, could alter biotic assemblages and lead to adverse ecological effects (e.g., physical smothering, direct chemical response).

In order to better understand rates of sediment deposition potentially associated with the Mary River Project operation and the potential implications of this sediment deposition on aquatic biota, Lake Sedimentation Monitoring was included as a special investigation component of the mine Aquatic Effects Monitoring Program (AEMP; Baffinland 2014; NSC 2014a). The primary issue of concern regarding any increased sedimentation due to Mary River Project operation is the potential effects to Arctic charr (*Salvelinus alpinus*) populations at mine area lakes, which can possibly be affected by:

- Changes in benthic invertebrate community structure and/or density due to habitat alteration that, in turn, alter the Arctic charr food base;
- Loss of Arctic charr spawning habitat resulting from entrapment of fine material and greater embeddedness of substrate used for spawning; and,
- Limiting the amount of oxygen available in Arctic charr spawning beds during the overwinter incubation period, resulting in reduced egg hatching success and/or reduced larvae survival following hatch (Berry et al. 2003).

The Mary River Project Lake Sedimentation Monitoring study is a year-round sampling program that was designed to track total dry weight sediment deposition at Sheardown Lake NW separately over ice-cover and open-water periods (Baffinland 2014; NSC 2014a,b, 2015). Sheardown Lake NW is expected to receive the highest inputs of sediment inputs through dust

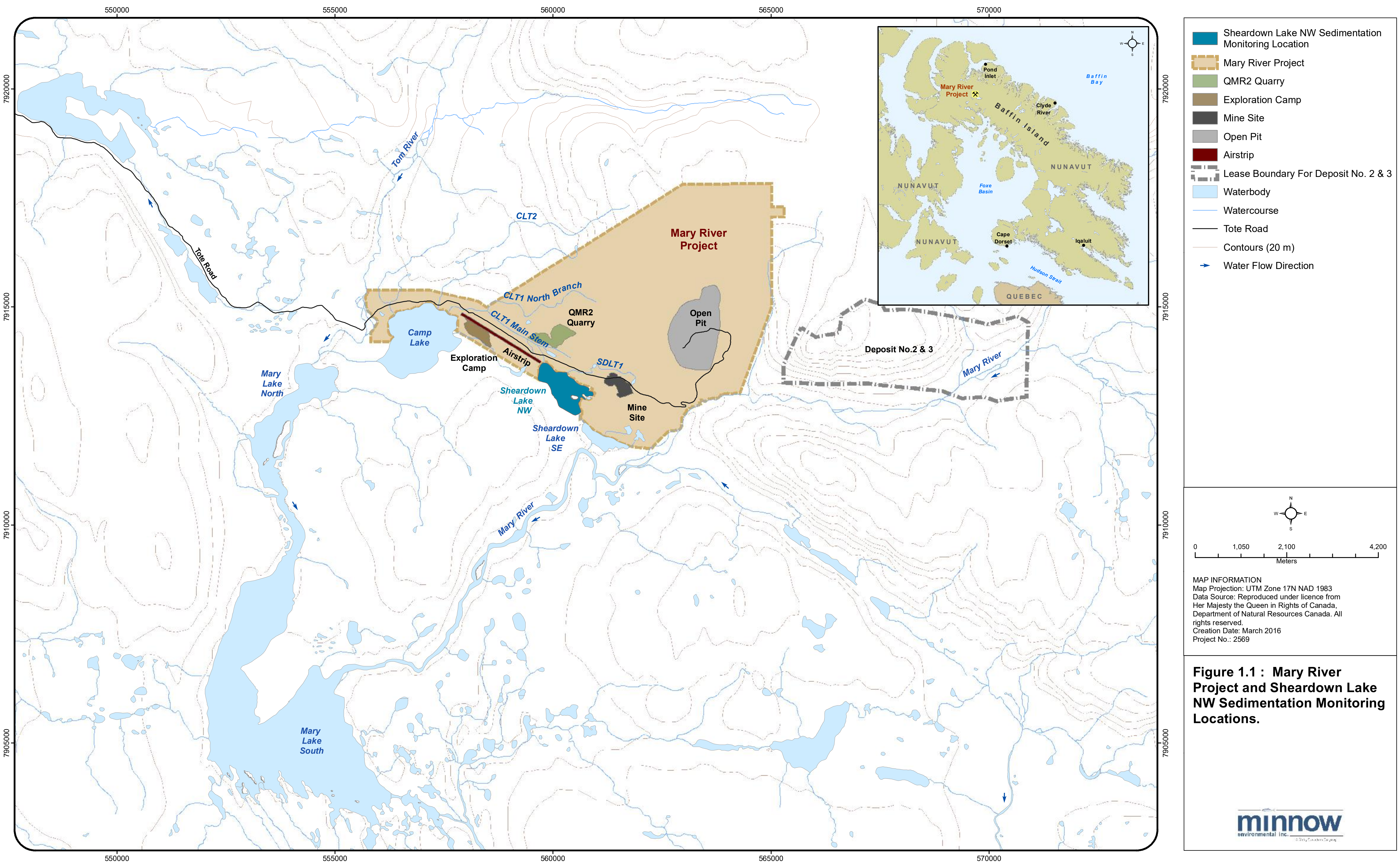


Figure 1.1 : Mary River Project and Sheardown Lake NW Sedimentation Monitoring Locations.

deposits and site runoff compared to other local waterbodies, and therefore this lake serves as the focus for the monitoring of lake sedimentation (Figure 1.1; NSC 2014b). Sedimentation monitoring was initiated at Sheardown Lake NW in 2013, with data collected from fall 2013 to fall 2014 serving as baseline for one full ice-cover and one full open-water period for the evaluation of potential effects of active Mary River Project operations on lake sedimentation. In June 2016, Environment and Climate Change Canada (ECCC) and Indigenous and Northern Affairs Canada (INAC) issued a *Fisheries Act* Direction (FAD) and a Letter of Non-Compliance (LNC), respectively, to Baffinland in response to unauthorized sediment releases to waterbodies associated with the Mary River Project (Baffinland 2016). Specifically, the FAD and LNC were issued as a result of aqueous Total Suspended Solids (TSS) concentrations above applicable discharge criteria at a number of watercourses on or adjacent to the mine property, Milne Port Tote Road and the mine haul road. Sheardown Lake NW receives discharge from one of the watercourses affected by the unauthorized sediment releases (i.e., Sheardown Lake Tributary 1 [SDLT1]). This report presents the results of the 2015 – 2016 Lake Sedimentation Monitoring study, including the evaluation of potential Mary River Project-related influences on sedimentation at Sheardown Lake NW in the second year following the onset of commercial mine operation in 2014. In consideration of the 2016 FAD and LNC, additional attention towards the evaluation of sedimentation-related effects at the area located nearest the SDLT1 outlet in Sheardown Lake NW was conducted for the 2016 assessment.

1.2 Report Organization

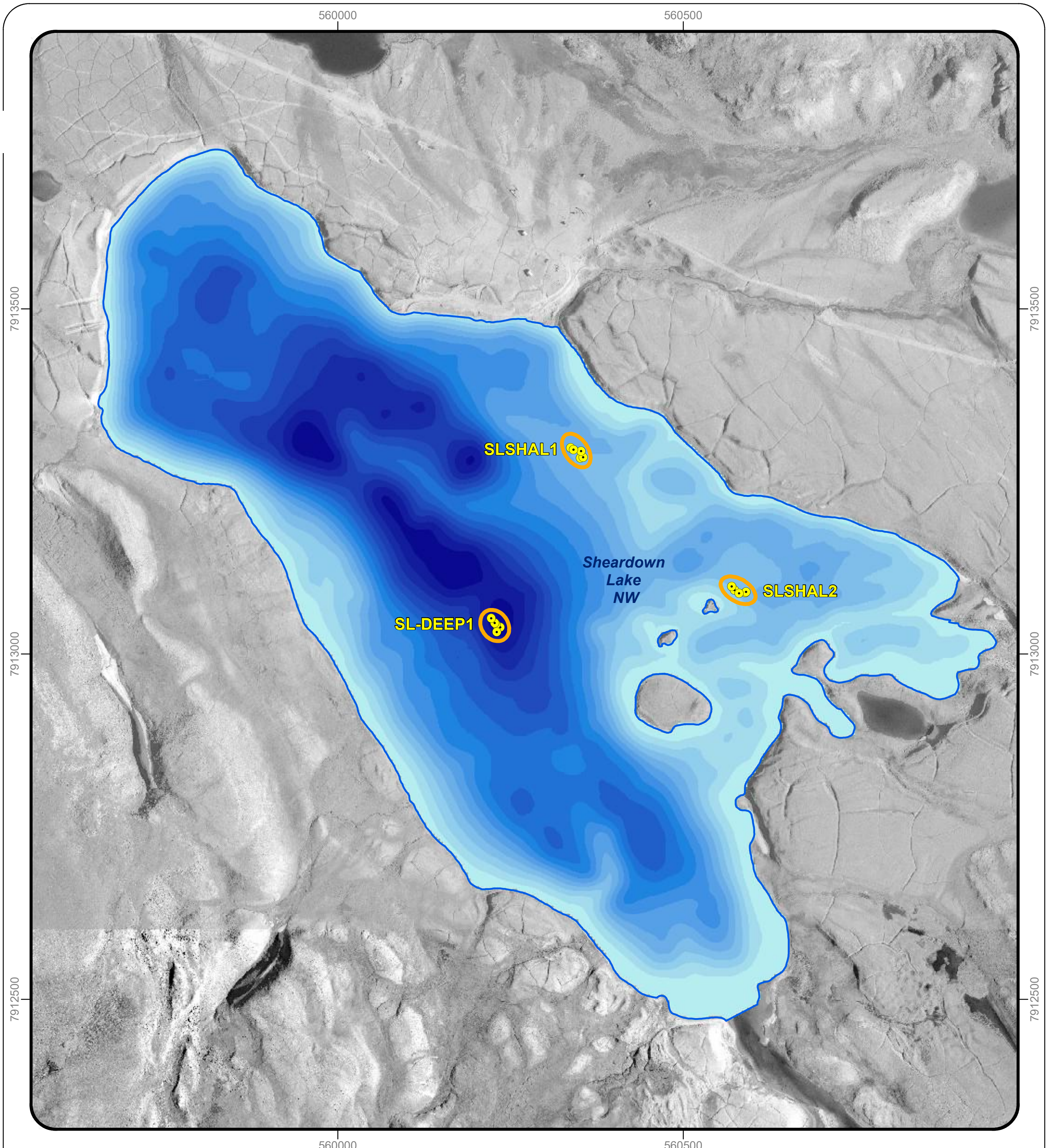
The content of this report reflects the approach outlined in the Lake Sedimentation Monitoring study design (Baffinland 2014; NSC 2014a,b) together with additional interpretive analysis conducted as part of the 2015 lake sedimentation report (Minnow 2016). A description of the study areas that serve as the focus for the Lake Sedimentation Monitoring study, as well as detailed methods used for the field sample collection, sample processing, sedimentation rate calculation and data analysis, are provided in Section 2.0. The lake sedimentation results are presented in Section 3.0, and conclusions of the 2015 – 2016 Lake Sedimentation Monitoring study are provided in Section 4.0. Finally, all references cited within this document are listed in Section 5.0.

2.0 STATION LOCATIONS AND STUDY METHODS

2.1 Station Locations

Increased sedimentation has the potential to affect Arctic charr populations by altering the benthic invertebrate food base (e.g., reduced invertebrate density and/or altering invertebrate community structure), reducing the quantity and/or quality of spawning habitat, and reducing egg hatching success (NSC 2014a,b). Three sedimentation monitoring stations were established to evaluate the amount of sedimentation in Sheardown Lake NW. The selection of station locations took into account dominant benthic habitat types present in the lake as well as habitat considered important for supporting the resident Arctic charr population. Accordingly, lake sediment deposition was assessed using sediment traps deployed at each of the three stations (Figure 2.1; Table 2.1) as follows:

1. Shallow Depositional Station (SL-SHAL1): Silt-loam represents the dominant substrate type in Sheardown Lake NW, and therefore increased sedimentation on habitat characterized by this substrate has the greatest potential to affect overall lake benthic invertebrate density and/or community structure. In turn, any benthic invertebrate community changes in habitat of this type has a high potential to affect the Arctic charr population. Silt substrate in the lake littoral zone (i.e., 2 – 12 m depth) was targeted for placement of this station to represent a potentially high sediment deposition habitat. Because this station is located near the outlet from Sheardown Lake Tributary 1, information acquired from this station also served to evaluate the extent to which unauthorized sediment releases affected sedimentation at Sheardown Lake NW in 2016.
2. Shallow Hard-Bottom Station (SL-SHAL2): Increased sedimentation at hard-bottom areas could reduce the amount of available spawning habitat and/or reduce egg hatching/reproductive success. Therefore, this station was established on coarse substrate (i.e., gravel, cobble) in the lake littoral zone at an area considered to provide suitable spawning habitat for Arctic charr.
3. Deep Profundal Station (SL-DEEP1): Because the main basin is the ultimate depositional zone for the lake, the highest sediment deposition rate is expected at this area that, in turn, provides an estimate of ‘maximum’ sedimentation. This station was established on silt substrate at the main lake basin in the lake profundal zone (30 m deep; Figure 2.1).



Sedimentation Monitoring Station

Bathymetry (m)

- 0- 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- 18 - 20
- 20 - 22
- 22 - 24
- 24 - 26
- 26 - 28
- 28 - 30

N W E S

0 100 200 400
Meters

MAP INFORMATION
Map Projection: UTM Zone 17N NAD 1983
Data Source: Reproduced under licence from Her Majesty the Queen in Rights of Canada, Department of Natural Resources Canada. All rights reserved.
Creation Date: March 2016
Project No.: 2569

Figure 2.1 : Sheardown Lake NW Lake Sedimentation Monitoring Locations, Mary River Project, 2014 - 2015.

minnow environmental inc.

Table 2.1: Sediment trap replicate station coordinates, habitat information and deployment and retrieval information, Sheardown Lake NW Sedimentation Monitoring Study, 2015 - 2016.

Station	Station Replicate	Location (UTM; Zone 17W)		Station Depth (m)	Substrate	Ice - Cover Period (2015 - 2016)			Open-Water Period (2016)		
		Easting	Northing			Date Deployed	Date Retrieved	Set Duration (days)	Date Deployed	Date Retrieved	Set Duration (days)
Shallow 1 (SL SHAL1)	SL-SHAL-1A	560346	7913299	9.1	cobble	7-Sep-15	13-Jul-16	310	-	-	-
	SL-SHAL-1B	560348	7913291	9.1	cobble	7-Sep-15	13-Jul-16	310	14-Jul-16	8-Sep-16	56
	SL-SHAL-1C	560349	7913289	8.9	cobble	7-Sep-15	13-Jul-16	310	14-Jul-16	8-Sep-16	56
	SL-SHAL-1D	560351	7913268	8.8	cobble	7-Sep-15	13-Jul-16	310	14-Jul-16	8-Sep-16	56
	SL-SHAL-1E	560340	7913279	8.8	cobble	7-Sep-15	13-Jul-16	310	14-Jul-16	8-Sep-16	56
Shallow 2 (SL SHAL2)	SL-SHAL-2A	560540	7913090	6	silt	7-Sep-15	13-Jul-16	310	14-Jul-16	8-Sep-16	56
	SL-SHAL-2B	560544	7913093	5.9	silt	7-Sep-15	13-Jul-16	310	-	-	-
	SL-SHAL-2C	560548	7913097	6.2	silt	7-Sep-15	13-Jul-16	310	14-Jul-16	8-Sep-16	56
	SL-SHAL-2D	560552	7913098	6.2	silt	7-Sep-15	13-Jul-16	310	14-Jul-16	8-Sep-16	56
	SL-SHAL-2E	560570	7913097	6.3	silt	7-Sep-15	13-Jul-16	310	14-Jul-16	8-Sep-16	56
Deep 1 (SL DEEP1)	SL-DEEP-1A	560235	7913039	29.5	silt	7-Sep-15	27-Jul-16	324	28-Jul-16	8-Sep-16	42
	SL-DEEP-1B	560229	7913043	29.4	silt	7-Sep-15	27-Jul-16	324	28-Jul-16	8-Sep-16	42
	SL-DEEP-1C	560227	7913045	29.5	silt	7-Sep-15	14-Jul-16	311	28-Jul-16	8-Sep-16	42
	SL-DEEP-1D	560230	7913032	29.6	silt	7-Sep-15	14-Jul-16	311	28-Jul-16	8-Sep-16	42
	SL-DEEP-1E	560222	7913052	29.5	silt	7-Sep-15	N/A	-	28-Jul-16	8-Sep-16	42

2.2 Field and Laboratory Methods

Five replicate sediment traps were originally deployed at each station in 2013 to monitor lake sedimentation. The sediment traps were constructed of three 50 cm long, 5 cm inside diameter polyvinyl chloride (PVC) pipes (i.e., 58.9 cm^2 surface area) sealed at the bottom and clamped together to create a single trap 'unit'. The sediment traps were designed to provide an aspect ratio of approximately 10:1, which meets the ≥ 5:1 aspect ratio generally recommended for cylindrical sediment traps to effectively monitor sediment deposition (Mudroch and MacKnight 1994). The sediment trap unit was secured to a float-anchor system designed to maintain the trap in an upright position for the duration of deployment. Under this system, the mouth of the sediment trap unit was situated approximately 1 m above the substrate.

Sedimentation was assessed separately for applicable ice-cover and open-water periods at Sheardown Lake NW. The seasonal timing of the ice breakup and freeze-up period at Sheardown Lake NW generally corresponds to early July and mid-September, respectively. For the 2015 – 2016 study, ice-cover period sediment traps were deployed 07 September 2015 and retrieved 13 – 27 July 2016 (310 – 324 day duration), and open-water period sediment traps were deployed 14 – 28 July 2016 and retrieved 08 September 2016 (42 – 56 day duration; Table 2.1). For the ice-cover period, each sediment trap was secured to a marker buoy deployed such that the marker buoy was submerged approximately 2 m below the water surface to avoid entrapment of the buoy by ice during winter, and a grappling tool was then required to secure the marker buoy and retrieve the sediment trap in the spring. For the open-water period, a surface marker buoy was attached to each sediment trap line to aid with trap location during retrieval. Supporting information recorded at each station during sediment trap deployment included water depth and Global Positioning System (GPS) coordinates.

One sediment trap was unable to be located at Station SL-SHAL2 following the ice-cover period in 2015, and therefore sedimentation data was acquired from the four remaining sediment traps at this study station for the 2015-2016 period. In 2016, one sediment trap was unable to be located at Station SL-DEEP1 following the ice-cover period, and therefore sedimentation data for this period was based on data from only four sediment traps. The irretrievable trap was found later in the season (August), but because a substantial amount of the open-water period had passed, sedimentation information from this trap was not included in the 2015 – 2016 analysis. The inability to locate sediment traps following the ice-cover period in 2015 and 2016 was due to the likely entrapment of the marker buoy by ice and subsequent relocation of the sediment trap. Also in 2016, single sediment traps from each of Stations SL-SHAL1 and SL-SHAL2 were unable to be located in September at the end of the open-water study period, resulting in the acquisition of sedimentation data from only four sediment traps for this study period. Strong winds and steeply contoured bathymetric features near the location of sediment trap deployment at these stations was believed to result in relocation of these sediment traps to deeper waters and, as a result of the submergence of the marker buoys, precluded the subsequent locating and retrieving of these traps later in the season. An additional sediment trap was deployed at each of Station SL-SHAL1 and Station SL-SHAL2 at the end of the open-water season to provide a full complement of sediment traps (i.e., 5) at each station.

Sediment trap retrieval involved pulling the entire unit to the surface very slowly to prevent sediment re-suspension in, and/or sediment loss from, each sediment trap. The entire contents of the trap, including all water and deposited sediment, was transferred into a 20 L plastic container pre-labelled with station identification and collection date information. Ambient water was used to rinse all sediment from each sediment trap, applied as a pressurized spray where appropriate. Upon complete removal of all material within the sediment trap, the sediment traps were redeployed at approximately the same locations of retrieval. Following collection of all sediment from individual traps, the sample containers were sealed and stored upright in the dark until submission to the analytical laboratory. The lake sedimentation samples were shipped to ALS Canada Ltd. (ALS; Waterloo, ON) for analysis of sediment total dry weight. At the laboratory, the sedimentation samples were filtered through a pre-weighed 0.70 µm glass fibre filter. The filter apparatus and container were rinsed three times to ensure complete removal of all sediment. The filter and residual sample material was dried at 105°C for two hours, allowed to cool for one hour, and then weighed to the nearest milligram using an appropriate balance with draft shield. As in previous studies, low sample volumes were encountered for each sediment trap replicate, and each station, for both of the 2015 – 2016 ice-cover and open-water period samples, precluding any additional analysis of the sedimentation material (e.g., sediment metal concentrations, dry bulk density).

2.3 Data Analysis

Sedimentation (deposition) rate was calculated for each replicate sediment trap using the equation (Kemp et al. 1974):

$$\textit{Sedimentation rate}\ \left(mg/cm^{-2}day^{-1}\right) = \frac{\textit{dry weight}\ (mg)}{\textit{total area}\ (cm^2)} \div \textit{deployment time period (day)}$$

The sedimentation data were evaluated statistically as follows: 1) spatial comparisons among the three stations for separate ice-cover and open-water periods; 2) comparisons between the ice-cover and open-water periods at each station; and, 3) temporal comparisons at each station among baseline (i.e., 2013 – 2014), 2014 - 2015 and 2015 - 2016 data sets separately for ice-cover and open-water periods. For the statistical analysis, raw data were assessed for normality and homogeneity of variance and log-transformed as necessary to meet test assumptions prior to conducting Analysis-of-Variance (ANOVA) and *post-hoc* tests, where appropriate. In instances where normality could not be achieved through data transformation, non-parametric Mann-Whitney U-test statistics were used to validate pair-wise statistical results, and Kruskal-Wallis H-tests were used to validate multiple station/year statistical results from the ANOVA using log-transformed data. Similarly, in instances in which normal data exhibited unequal variance despite log transformation, Student's t-tests were used assuming unequal variance to validate the statistical findings of the ANOVA tests for two-group comparisons. For multiple station or year comparisons, Tukey's Honestly Significant Difference (HSD) or Tamhane's *post-hoc* tests were conducted in cases in which normal data with equal and unequal variance, respectively, were encountered. All statistical comparisons were conducted using SPSS Version 12.0 software (SPSS Inc., Chicago, IL).

In addition to the analysis of sedimentation rates, an estimate of the uncompacted thickness (i.e., mm) of sediment accumulation was also calculated separately for each of the ice-cover and open-water periods using the equation (Kemp et al. 1974):

$$\textit{Accumulation thickness}\ (mm \cdot yr^{-1}) = \frac{\textit{Sedimentation rate}\ (mg \cdot cm^{-2} yr^{-1})}{\textit{Dry bulk density}\ (mg \cdot cm^{-3})}$$

In lieu of sufficient sample volumes to determine bulk density of sedimentation material, bulk density information from similar sedimentation studies conducted by Minnow Environmental Inc. (Minnow; unpublished data) at Canadian Shield lakes in northern Ontario was used as a surrogate for the calculation of sediment accumulation. Because these Minnow data were collected over the summer open-water period at temperate latitudes where aquatic biological productivity can be expected to be higher than at polar latitudes, the calculation of annual accumulation thickness using the Minnow bulk density information is likely to overestimate actual accumulation thickness for Sheardown Lake NW. Therefore, the derived accumulation thicknesses for the Mary River Project using these methods were considered conservative estimates of actual values. Adverse effects on fish egg survival have been documented for a sediment accumulation thickness exceeding approximately 1 mm during the egg incubation period (Morgan et al. 1983; Fudge and Bodaly 1984). Therefore, an accumulation thickness of 1 mm was used as a threshold for potential effects to Arctic charr egg incubation associated with sediment deposits at the Mary River Project. On Baffin Island, Arctic charr spawning occurs in autumn (September-October) and although egg hatch occurs in early April, larval emergence generally does not occur until ice breakup in mid-July (Scott and Crossman 1998). Because this period essentially mirrors the ice-cover period used in this study, accumulation thickness for the ice-cover period was used to evaluate potential effects of depositing sediment on Arctic charr egg survival at Sheardown Lake NW.

3.0 RESULTS

3.1 Sedimentation Rates

3.1.1 2015–2016 Season

Spatially within Sheardown Lake NW, sedimentation rates were lower at the shallow littoral stations (i.e., SL-SHAL1 and SL-SHAL2) than at the deep profundal station (i.e., main basin Station SL-DEEP1) during both the 2015-2016 ice-cover and 2016 open-water periods (Figure 3.1; Appendix Tables A.1 and A.2). The occurrence of highest sedimentation rate at the deepest area of Sheardown Lake NW was consistent with normal lake deposition patterns (see Wetzel 2001). Notably, the sedimentation rate nearest the SDLT1 tributary outlet (i.e., Station SL-SHAL1) was significantly lower than at stations SL-SHAL2 and SL-DEEP1 for the ice-cover period, and compared to the main basin (Station SL-DEEP1) for the open-water period (Appendix Table A.4). This suggested that sediment deposition in 2016 was relatively low at shallow, silt-bottomed littoral areas of Sheardown Lake NW that provide key habitat for benthic invertebrates that serve as the food base for resident Arctic charr. The 2015 - 2016 sedimentation rate at Station SL-SHAL2, which represents shallow, rocky littoral areas that potentially provide spawning habitat for Arctic charr in Sheardown Lake NW, were intermediate to or lower than the rates at the shallow and deep depositional stations for ice-cover and open-water periods, respectively (Figure 3.1).

Sedimentation rates were significantly higher during the open-water period compared to the ice-cover period at all three Sheardown Lake NW sedimentation monitoring stations (Appendix Table A.5). On average, sedimentation rates ranged from 1.5 – 3.0 times greater during the open-water period compared to the ice-cover period, potentially reflecting a combination of greater sources of sediment generated by the mine during the summer (e.g., fugitive dust) and/or naturally greater organic (e.g., phytoplankton) productivity during the open-water period. Nevertheless, approximately 70 – 79% of the total sediment deposited at the Sheardown Lake NW stations in 2015-2016 occurred over the ice-cover period (Appendix Table A.7), reflecting the much longer period of ice-cover compared to open-water through a typical year in the arctic.

Annual sedimentation extrapolated from the 2015-2016 Sheardown Lake NW data indicated approximately 27.1 and 31.3 mg/cm^2/year of sediment deposition at the SL-SHAL1 and SL-SHAL2 littoral stations, respectively, and 39.6 mg/cm^2/year of sediment deposition at the SL-DEEP1 profundal station. These annual rates were within the range of those observed at other Canadian arctic lakes (e.g., 7 – 50 mg/cm^2/year; Lockhart et al. 1998) and much lower than at proglacial lakes in south-east Greenland (e.g., mean of 790 mg/cm^2/year; Hasholt et al. 2000).

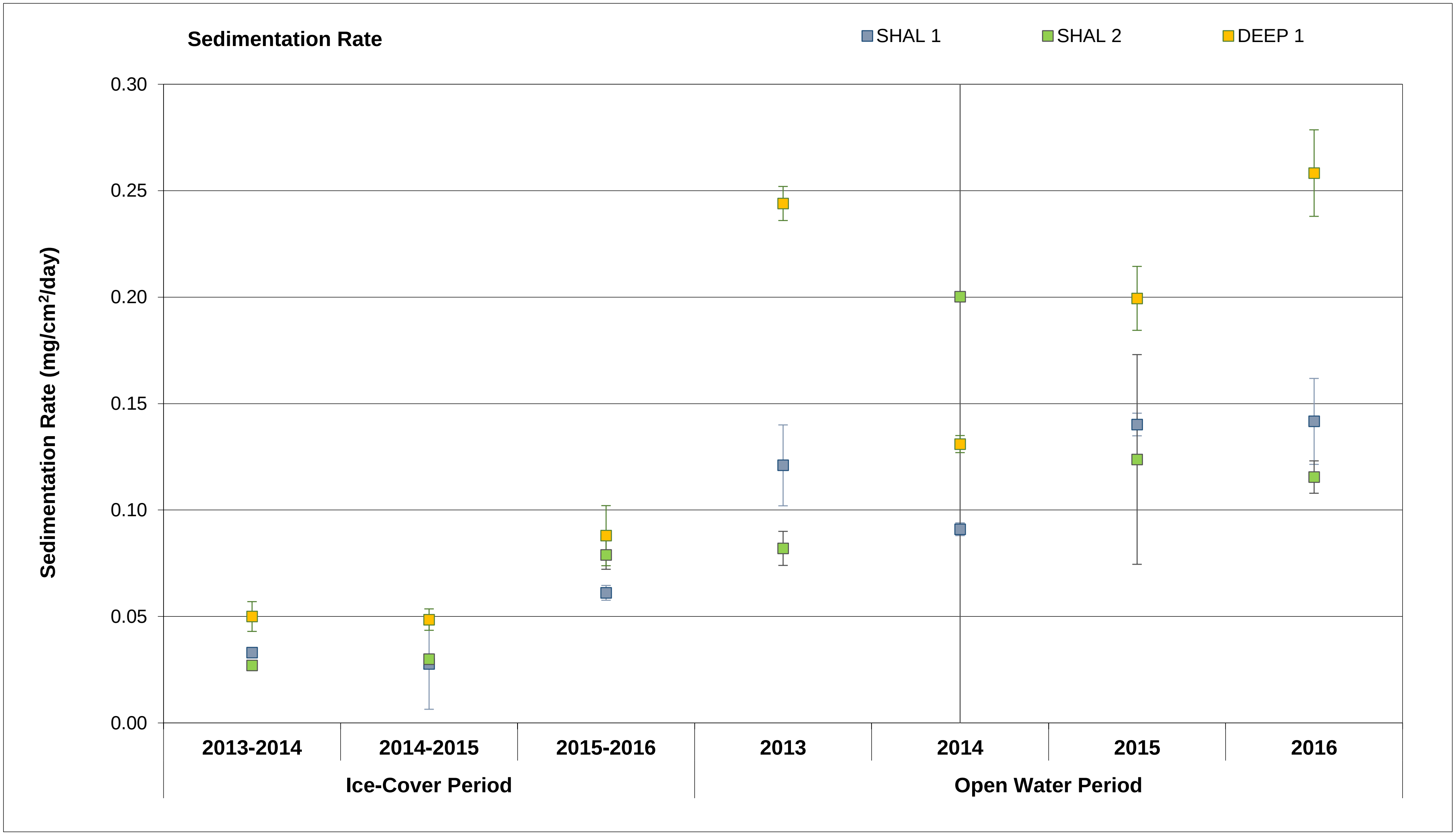


Figure 3.1: Sedimentation rates during ice-cover and open-water periods at Sheardown Lake NW over mine baseline (2013 - 2014) and operational (2015 - 2016) phases, Mary River Project Lake Sedimentation Monitoring Study.

Therefore, the annual sedimentation rate at Sheardown Lake NW in 2016 was within ranges typical for Arctic lakes.

3.1.2 Temporal Comparisons

Sedimentation rates over the 2015-2016 ice-cover period were significantly greater than the rate determined for the mine baseline study (2013 – 2014) and previous year of mine operation (2014 – 2015) at all Sheardown Lake NW lake sedimentation monitoring stations (Figure 3.1; Appendix Table A.6). Ice-cover period sedimentation rates at all three Sheardown Lake NW stations were uniformly about 2 – 3 times higher in 2015-2016 compared to rates at each respective station in the two previous studies (Figure 3.1). A similar magnitude of difference in sedimentation rates occurred between 2015- 2016 and the two previous studies at all stations for the ice-cover period. Relatively uniform sedimentation rates among the three Sheardown Lake NW stations in 2015-2016 suggested a broad-scale source of sediment to the lake (e.g., deposits from fugitive dust, autochthonous organic matter) and/or wide-scale dispersal of sediment from a point source (or sources) potentially related to physical properties of the depositing sediment (e.g., particle size, shape and/or relative density). Open-water season sedimentation rates were significantly higher at stations SL-SHAL1 and SL-DEEP1 in 2016 compared to the 2014 study (Appendix Table A.6). However, mean sedimentation rates in the 2016 open-water season at all of the Sheardown Lake NW stations were comparable to those observed during the 2013 baseline study, suggesting that sediment deposition in the 2016 open-water season was within the natural range of baseline conditions (Figure 3.1).

Annualized sedimentation rates for 2015 - 2016 (i.e., 27.1 – 39.5 mg/cm^2/year) were higher than rates during the 2013 - 2014 baseline period (i.e., 14.3 – 21.2 mg/cm^2/year; from NSC 2014a) and the 2014 - 2015 study (i.e., 15.5 – 24.5 mg/cm^2/year), largely as a result of higher sedimentation during the 2015 – 2016 ice-cover period. Overall, greater sedimentation rates occurred at Sheardown Lake NW during the 2015 – 2016 ice-cover period than during either the 2013 – 2014 mine baseline or 2014 – 2015 mine operational periods, suggesting a mine-related influence during the 2015 - 2016 ice-cover period. However, mine-related influences on Sheardown Lake NW sedimentation did not extend into the 2016 open-water season as evidenced through comparable sedimentation rates among 2013, 2014, 2015 and 2016 open-water period monitoring.

3.2 Sediment Accumulation Estimate

Annual accumulation thickness of sediment calculated for Sheardown Lake NW ranged from 1.36 mm/year at shallow littoral Station SL-SHAL1 to 2.02 mm/year at the deep profundal Station SL-DEEP1. These sediment accumulation thicknesses were higher than those observed among seven arctic lakes in western Greenland, which ranged from 0.27 ± 0.12 to 1.2 ± 0.32 mm/year and averaged 0.54 mm/yr (Sobek et al. 2014). In addition, the annual accumulation thicknesses at Sheardown Lake NW were greater in 2016 than in 2015, the latter of which ranged from 0.79 mm/year at the shallow littoral stations to 1.25 mm/year at the deep profundal station of Sheardown Lake NW (Minnow 2016). Therefore, the 2016 results supported the findings of the sedimentation rate analysis, and suggested greater sedimentation at Sheardown Lake NW in 2016 compared to previous studies.

Adverse effects on fish egg survival have been documented for a sediment accumulation thickness exceeding approximately 1 mm during the egg incubation period (Morgan et al. 1983; Fudge and Bodaly 1984). The sediment accumulation thickness calculated for the Arctic charr egg incubation/larval pre-emergence period (i.e., approximately mid-September to mid-July; Scott and Crossman 1998) at Sheardown Lake NW varied from 0.96 ± 0.05 mm at the littoral hard-bottomed station (i.e., SL-SHAL1) to 1.24 ± 0.11 mm at the littoral silt-bottomed station (i.e., SL-SHAL2). The highest sediment accumulation thickness for Sheardown Lake NW over the anticipated Arctic charr egg incubation/larval pre-emergence period was predicted for the profundal soft-bottomed station at the main basin of the lake (1.42 ± 0.24 mm). Because the accumulation thickness was near or slightly greater than 1 mm over the duration of the anticipated Arctic charr egg incubation/larval pre-emergence period, Arctic charr hatch success was potentially affected as a result of relatively high sedimentation at Sheardown Lake NW in 2016.

Arctic charr population monitoring conducted as part of the Mary River Project CREMP indicated substantially higher relative abundance of young-of-the-year (YOY) along nearshore areas of Sheardown Lake NW than at a comparable reference lake in 2016 based on electrofishing catch-per-unit-effort (CPUE; 0.47 and 0.20 YOY per electrofishing minute, respectively; Minnow 2017). In addition, nearshore electrofishing CPUE for Arctic charr YOY at Sheardown Lake NW was greater in 2016 than in 2015 (i.e., 0.13 YOY per electrofishing minute). Arctic charr YOY from Sheardown Lake NW were also significantly heavier and longer, showed significantly faster growth, and did not differ significantly in condition (i.e., weight-at-length relationship) from those at the reference lake in 2016 (Minnow 2017). Collectively, these data indicated successful Arctic charr hatch, emergence, and subsequent YOY growth at Sheardown Lake NW in 2016. In turn, this suggested that sediment accumulation thicknesses calculated for the Arctic charr incubation period at Sheardown Lake NW there were based on bulk density information from northern Ontario lakes may have overestimated actual accumulation thicknesses at Sheardown Lake NW in 2016. Specifically, the data used to estimate sediment accumulation at Sheardown Lake NW were based on bulk density information collected at temperate latitudes over the summer period when aquatic biological productivity can be expected to be higher than at polar latitudes. Therefore, the derived accumulation thicknesses for Sheardown Lake NW can be considered conservative (over)estimates of actual values. This was supported by Arctic charr YOY catch and health data, which indicated relatively high abundance of healthy YOY and suggested no adverse influences of sedimentation on egg hatch success, larval emergence and early life stage growth of Arctic charr at Sheardown Lake in 2016.

4.0 CONCLUSIONS

Lake Sedimentation Monitoring is included as a special investigation component of the Mary River Project AEMP to track sedimentation and evaluate the potential for adverse influences on resident Arctic charr populations related to excessive sedimentation at a representative lake (Sheardown Lake NW) within the immediate area of mine influence (NSC 2014a,b, 2015). Sedimentation monitoring was initiated in 2013 – 2014 to provide information prior to the start-up of active mine operations. The principal conclusions of 2015 – 2016 lake sedimentation monitoring study are as follows:

- Annual sedimentation rate at Sheardown Lake NW in 2015 – 2016 was within the range observed among Canadian arctic lakes uninfluenced by anthropogenic activities.
- Sedimentation rates over the ice-cover period were significantly higher in 2015 - 2016 than during the mine baseline (2013 – 2014) and early operational (2014 - 2015) phases at Sheardown Lake NW. In addition, annualized sedimentation rates in 2015 - 2016 were higher than those during the 2013 - 2014 baseline and 2014 – 2015 mine operational phases. Therefore, the temporal data suggested higher sedimentation rates at Sheardown Lake NW during the 2015 – 2016 ice-cover period compared to previous studies.
- Annual accumulation thickness of sediment at Sheardown Lake NW in 2015 – 2016 was in the upper range of that documented at pristine Arctic lakes, suggesting that sedimentation at Sheardown Lake NW was relatively high. In addition, sediment accumulation thickness over the duration of the anticipated 2015 – 2016 Arctic charr egg incubation/larval pre-emergence period at Sheardown Lake NW was near a threshold effect level of 1 mm of sediment deposition for effects on salmonid egg hatch success. However, because a relatively high abundance of healthy Arctic charr YOY was observed at Sheardown Lake NW in 2016, derived accumulation thicknesses that were based on bulk density data from temperate latitudes likely overestimated actual sediment accumulations for Sheardown Lake NW.

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APPENDIX A

SEDIMENTATION INFORMATION

Table A.1: Sediment trap results for the 2014 - 2015 ice-cover period at Sheardown Lake NW, Lake Sedimentation Monitoring Study, 2014 - 2015.

Station	Station Replicate	Retrieval Location (UTM; Zone 17W)		Station Depth (m)	Date Deployed	Date Retrieved	Set Duration (days)	Total Dry Weight (g)	Sedimentation Rate (mg/cm^2/day)
		Easting	Northing						
Shallow 1 (SL SHAL1)	SL-SHAL-1A	560346	7913299	9.1	7-Sep-15	13-Jul-16	310	1.16	0.064
	SL-SHAL-1B	560348	7913291	9.1	7-Sep-15	13-Jul-16	310	1.13	0.062
	SL-SHAL-1C	560349	7913289	8.9	7-Sep-15	13-Jul-16	310	1.09	0.060
	SL-SHAL-1D	560351	7913268	8.8	7-Sep-15	13-Jul-16	310	1.02	0.056
	SL-SHAL-1E	560340	7913279	8.8	7-Sep-15	13-Jul-16	310	1.18	0.065
						Average	**310**	**1.116**	**0.061**
						Standard Deviation	**0.0**	**0.063**	**0.003**
Shallow 2 (SL SHAL2)	SL-SHAL-2A	560540	7913090	6.0	7-Sep-15	13-Jul-16	310	1.50	0.082
	SL-SHAL-2B	560544	7913093	5.9	7-Sep-15	13-Jul-16	310	1.34	0.073
	SL-SHAL-2C	560548	7913097	6.2	7-Sep-15	13-Jul-16	310	1.55	0.085
	SL-SHAL-2D	560552	7913098	6.2	7-Sep-15	13-Jul-16	310	1.28	0.070
	SL-SHAL-2E	560570	7913097	6.3	7-Sep-15	13-Jul-16	310	1.54	0.084
						Average	**310**	**1.442**	**0.079**
						Standard Deviation	**0.0**	**0.124**	**0.007**
Deep 1 (SL DEEP1)	SL-DEEP-1A	560235	7913039	29.5	7-Sep-15	27-Jul-16	324	2.08	0.109
	SL-DEEP-1B	560229	7913043	29.4	7-Sep-15	27-Jul-16	324	1.50	0.079
	SL-DEEP-1C	560227	7913045	29.5	7-Sep-15	14-Jul-16	311	1.51	0.082
	SL-DEEP-1D	560230	7913032	29.6	7-Sep-15	14-Jul-16	311	1.50	0.082
	SL-DEEP-1E	560222	7913052	29.5	7-Sep-15	N/A	-	-	-
						Average	**317.5**	**1.648**	**0.088**
						Standard Deviation	**7.5**	**0.288**	**0.014**

Table A.2: Sediment trap results for the 2016 open-water period at Sheardown Lake NW, Lake Sedimentation Monitoring Study, 2015 - 2016.

Station	Station Replicate	Retrieval Location (UTM; Zone 17W)		Station Depth (m)	Date Deployed	Date Retrieved	Set Duration (days)	Total Dry Weight (g)	Sedimentation Rate (mg/cm^2/day)
		Easting	Northing						
Shallow 1 (SL SHAL1)	SL-SHAL-1A	-	-	-	-	-	-	-	-
	SL-SHAL-1B	560378	7913304	9.1	14-Jul-16	8-Sep-16	56	0.48	0.146
	SL-SHAL-1C	560373	7913299	8.9	14-Jul-16	8-Sep-16	56	0.392	0.119
	SL-SHAL-1D	560375	7913308	8.8	14-Jul-16	8-Sep-16	56	0.551	0.167
	SL-SHAL-1E	560376	7913303	8.8	14-Jul-16	8-Sep-16	56	0.446	0.135
						Average	**56**	**0.467**	**0.142**
						Standard Deviation	**0.0**	**0.067**	**0.020**
Shallow 2 (SL SHAL2)	SL-SHAL-2A	560552	7913107	6	14-Jul-16	8-Sep-16	56	0.351	0.106
	SL-SHAL-2B	-	-	5.9	-	-	-	-	-
	SL-SHAL-2C	560552	7913106	6.2	14-Jul-16	8-Sep-16	56	0.37	0.112
	SL-SHAL-2D	560551	7913108	6.2	14-Jul-16	8-Sep-16	56	0.405	0.123
	SL-SHAL-2E	560551	7913106	6.3	14-Jul-16	8-Sep-16	56	0.398	0.121
						Average	**56.0**	**0.381**	**0.116**
						Standard Deviation	**0**	**0.025**	**0.008**
Deep 1 (SL DEEP1)	SL-DEEP-1A	560241	7913032	29.5	28-Jul-16	8-Sep-16	42	0.636	0.257
	SL-DEEP-1B	560236	7913043	29.4	28-Jul-16	8-Sep-16	42	0.638	0.258
	SL-DEEP-1C	560229	7913044	29.5	28-Jul-16	8-Sep-16	42	0.606	0.245
	SL-DEEP-1D	560234	7913034	29.6	28-Jul-16	8-Sep-16	42	0.722	0.292
	SL-DEEP-1E	560221	7913050	29.5	28-Jul-16	8-Sep-16	42	0.593	0.240
						Average	**42**	**0.639**	**0.258**
						Standard Deviation	**0**	**0.050**	**0.020**

Table A.3: Sedimentation (mg/cm^2/day) summary statistics for Sheardown Lake NW, Lake Sedimentation Monitoring Study, 2015 - 2016

Study Period	Station	Sample Size	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
						Lower Bound	Upper Bound		
Ice-Cover 2015 - 2016	SL SHAL 1	5	0.061	0.003	0.002	0.057	0.065	0.056	0.065
	SL SHAL 2	5	0.079	0.007	0.003	0.071	0.087	0.070	0.085
	SL DEEP1	4	0.088	0.014	0.007	0.066	0.110	0.079	0.109
Open-Water 2016	SL SHAL 1	4	0.142	0.020	0.010	0.110	0.174	0.119	0.167
	SL SHAL 2	4	0.116	0.008	0.004	0.103	0.128	0.106	0.123
	SL DEEP1	5	0.258	0.020	0.009	0.233	0.284	0.240	0.292

Table A.4: Statistical comparison of sedimentation among Sheardown Lake NW stations for ice-cover and open-water periods, Lake Sedimentation Monitoring Study, 2015 - 2016.

Study Period	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
	Significant Difference Among Areas?	p-value	Staistical Test[b]	(I) Area	(J) Area	Significant Difference Between 2 Areas?	p-value	Statistical Test
Ice-Cover 2015 - 2016	YES	0.00065	ANOVA[c]	SL SHAL1	SL SHAL2	YES	0.0055	Tukey's HSD[d]
				SL SHAL1	SL DEEP1	YES	0.0007	
				SL SHAL2	SL DEEP1	NO	0.3233	
Open-Water 2016	YES	0.00000	ANOVA[d]	SL SHAL1	SL SHAL2	NO	0.1355	Tukey's HSD[d]
				SL SHAL1	SL DEEP1	YES	0.0000	
				SL SHAL2	SL DEEP1	YES	0.0000	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Statistical tests include Analysis of Variance (ANOVA) and Kruskal Wallis H-test (KW H-test).

[c] Data non-normal despite log-transformation. Therefore, multiple-group ANOVA results validated using Kruskal-Wallis H-test (KW test) performed on log-transformed data (KW test p = 0.0106) and pair-wise ANOVA results validated using Mann-Whitney U-tests performed on log-transformed data.

[d] Untransformed data were normally distributed and homogenous, and therefore no data transformation was used for the multiple-group comparison and post-hoc pair-wise comparisons.

Table A.5: Statistical comparison of sedimentation (mg/cm^2/day) between the 2015-2016 ice-cover and 2016 open-water periods at Sheardown Lake NW, Lake Sedimentation Monitoring Study, 2015 - 2016.

Station	Statistical Test Results			Summary Statistics						
	Significant Difference Between Areas?	*p* -value	Statistical Analysis[a]	Period	N	Mean	Standard Deviation	Standard Error	Minimum	Maximum
SL SHAL1	YES	0.000	β , γ	Ice-Cover 2015-2016	5	0.061	0.003	0.002	0.056	0.065
				Open-Water 2016	4	0.142	0.020	0.010	0.119	0.167
SL SHAL2	YES	0.000	α , γ	Ice-Cover 2015-2016	5	0.079	0.007	0.003	0.070	0.085
				Open-Water 2016	4	0.116	0.008	0.004	0.106	0.123
SL DEEP1	YES	0.000	β , δ	Ice-Cover 2015-2016	4	0.088	0.014	0.007	0.079	0.109
				Open-Water 2016	5	0.258	0.020	0.009	0.240	0.292

[a] Data analysis included: α - data untransformed; β - data log transformed; γ - single factor ANOVA test conducted; δ - single-factor ANOVA test results validated using Mann-Whitney U-test; and, ε - single-factor ANOVA test results validated using t-test assuming unequal variance.

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Table A.6: Statistical comparison of sedimentation rates between mine baseline (2013, 2014) and operational (2015, 2016) phases at Sheardown Lake NW during ice-cover and open-water periods, Lake Sedimentation Monitoring Study.

Station	Study Period	Overall 3-group Comparison			Pair-wise, post-hoc comparisons[a]				
		Significant Difference Among Areas?	p-value	Staistical Test[b]	(I) Area	(J) Area	Significant Difference Between 2 Areas?	p-value	Statistical Test
Shallow 1 (SHAL1)	Ice-Cover	YES	0.00552	ANOVA[b]	2013 - 2014	2014 - 2015	NO	0.3488	Tukey's HSD[b]
					2013 - 2014	2015 - 2016	YES	0.0785	
					2014 - 2015	2015 - 2016	YES	0.0044	
	Open-Water	YES	0.00029	ANOVA[c]	2014	2015	YES	0.0007	Tukey's HSD[c]
					2014	2016	YES	0.0009	
					2015	2016	NO	0.9916	
Shallow 2 (SHAL2)	Ice-Cover	YES	0.00000	ANOVA[c]	2013 - 2014	2014 - 2015	NO	0.3057	Tamhane's [c]
					2013 - 2014	2015 - 2016	YES	0.0001	
					2014 - 2015	2015 - 2016	YES	0.0001	
	Open-Water	NO	0.57662	ANOVA[c]	2014	2015	NO	0.8871	Tamhane's [c]
					2014	2016	NO	0.8513	
					2015	2016	NO	0.9863	
Deep 1 (DEEP1)	Ice-Cover	YES	0.00007	ANOVA[b]	2013 - 2014	2014 - 2015	NO	0.9242	Tukey's HSD[b]
					2013 - 2014	2015 - 2016	YES	0.0002	
					2014 - 2015	2015 - 2016	YES	0.0001	
	Open-Water	YES	0.00000	ANOVA[c]	2014	2015	YES	0.0000	Tukey's HSD[c]
					2014	2016	YES	0.0000	
					2015	2016	YES	0.0001	

[a] Post-hoc analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Untransformed data were non-normally distributed; log-transformation resulted in normally distributed data. and thus the log-transformed data were used for statistical tests.

[c] Untransformed data were normally distributed, and thus un-transformed data used for statistical tests.

APPENDIX D.9.3

2016 HYDROMETRIC MONITORING PROGRAM

STORY environmental inc

MEMO

To:	Jim Millard Environmental Manager Baffinland Iron Mines	**From:**	Andrew Rees, Ph.D., EP Senior Environmental Scientist
Re:	2016 Hydrometric Monitoring Program	**Date:**	28 February 2017
		Proj No:	199-03-09

1 Introduction

The 2016 Mary River Hydrometric Monitoring Program was initiated in late June around the onset of the spring melt period. Site visits were conducted by Story Environmental Inc. ("SEI") to re-install pressure transducers and conduct flow measurements at the six previously established monitoring stations (Table 1.1). The hydrometric stations are a part of the streamflow monitoring program supporting the Aquatic Effects Monitoring Plan ("AEMP").

Table 1.1 2016 Hydrometric Monitoring Stations

Station ID	Station Name	Period of Record	Drainage Area (km^2)	Coordinates (UTM)	
				Easting	Northing
H01	Phillips Creek Tributary	2006-2008, 2011-2016	250	532831	7946247
H02	Tom River near outlet to Mary Lake	2006-2008, 2010-2016	210	555712	7915514
H04	Camp Lake Tributary (CLT-2)	2006-2008, 2010-2016	8.3	557639	7915579
H05	Camp Lake Tributary (CLT-1)	2006-2008, 2010-2016	5.3	558906	7915079
H06	Mary River	2006-2008, 2010-2016	240	563922	7912984
H11	Sheardown Lake Tributary (SDLT-1)	2011-2016	3.6	560503	7913545

During the June site visit, benchmark and water level surveys were conducted and pressure transducers were installed. Discharge was measured using the velocity-area technique and a wading current meter where lower flows permitted safe access to the channel and using dilution gauging where higher flows were present. Final site visits were made by Baffinland Iron Mines ("BIM") staff between 3 and 7 September to remove the stations prior to winter freeze-up.

2 Stage-Discharge Measurements

The stage-discharge data obtained in 2016 were compared to the existing rating curves summarized in the 2015 Hydrometric Monitoring Program Summary (SEI, 2016). The rating curves for each station, inclusive of the 2016 measurements, are provided on Figures 1 to 6. A discussion and interpretation of the fit of the current data to the existing rating curves is provided in the following sections:

- **H01 (Phillip's Creek Tributary)** - A stage-discharge measurement was recorded at H01 during the June site visit using dilution gauging and is consistent with the existing rating curve (Figure 1). As such, the existing rating curve was used for the development of the 2016 streamflow record.
- **H02 (Tom River)** - A stage-discharge measurement was recorded at H02 during the June site visit using dilution gauging and the flow measured plots lower than the previous rating curve (Figure 2). As noted in SEI, 2015, the data from 2013 to 2015 suggested that there has been a shift in the rating curve. The 2016 discharge measurement also supports this shift in the rating curve and an updated rating curve has been developed and was used for the development of the 2016 flow record. Additional high flow measurements are recommended to verify the upper half of the rating curve
- **H04 (Camp Lake Tributary CLT-2)** - A stage-discharge measurement was recorded at H04 during the June site visit and is consistent with the updated rating curve proposed in SEI, 2016 (Figure 3). The June measurement was during higher flow than previous measurements and helps validate the upper half of the rating curve. There is less confidence in the accuracy of the rating curve for flows above 0.7 m^3/s. Additional high flow measurements are recommended to further validate the updated rating curve at H04. The updated rating curve was used for the development of the 2016 flow record.
- **H05 (Camp Lake Tributary CLT-1)** – The stage-discharge measurement recorded at H05 during the June site visit was consistent with the existing rating curve (Figure 4). The rating curve was used for the development of the 2016 flow record.
- **H06 (Mary River)** – A stage-discharge measurement was recorded at H06 during the June site visit using dilution gauging and is generally consistent with the existing rating curve (Figure 5). The discharge measurement demonstrates that the rating curve for H06 remains valid and that the channel appears to be stable. The existing rating curve was used for the development of the 2016 flow record.
- **H11 (Sheardown Lake Tributary SDLT-1)** – A stage-discharge measurements was recorded at H11 during the June site visit and is consistent with the rating curve updated in 2014 (Figure 6). There remains some uncertainty around higher stage-discharge conditions at H11 due to the lack of field measurements for validation. In future years, higher flow measurements should be obtained at H11 to validate the updated rating curve. The updated rating curve was used for the development of the 2016 flow record.

3 Streamflow Hydrographs

Streamflow records were developed for each station by applying the water level records to the corresponding rating curves. The discharge hydrographs for H01, H02, H04, H05, H06, and H11 are presented on Figures 7 to 12. Each water level record underwent a quality review and periods affected by channel ice or other anomalies were removed from the record.

The discharge records were converted to equivalent unit runoff (discharge per unit area) and are compared to the daily precipitation records on Figure 13. The records of unit runoff generally agree well with each other, exhibiting similar timing and magnitude of runoff events and similar patterns to previous years. As during previous years, the station at H11, with a generally lower elevation catchment, exhibited a much smaller freshet and muted response to precipitation events.

A strong diurnal melt pattern is evident through the end of June and first half of July. The snowmelt at lower elevations and the peak of freshet flows occurred earlier than normal at the stations with smaller and lower elevation catchment areas (H04, H05, and H11) and was not captured in the data. The peak freshet flows at the stations with larger catchments (H01, H02, and H06) occurred in late June. The peak flows at H01, H02, and H06 were similar to 2015 but lower than previous years and occurred over a typical duration. A summary of flows at H05 from 2006 to 2016 is shown on Figure 14. The total annual runoff in 2016 at the H05 station was greater than in 2015 but the third lowest recorded from 2006 to 2016. Both 2015 and 2016 had lower than normal flows in mid-July and from mid-August to early September. The estimated mean monthly discharge and unit runoff for each station in 2016 are summarized in Table 3.1.

Table 3.1 Summary of 2016 Mean Monthly Estimated Discharge and Unit Runoff

STATION	Estimated Mean Monthly Discharge (m^3/s)				Period of Record
	June	July	August	September	
H01	18.1*	8.3	5.7	1.7*	June 25 to September 5
H02	25.5*	6.7	3.9	0.5*	June 26 to September 5
H04	0.59*	0.17	0.23	0.09*	June 23 to September 4
H05	0.17*	0.05	0.13	0.03*	June 23 to September 4
H06	36.5*	13.1	7.2	1.7*	June 26 to September 4
H11	0.03*	0.04	0.13	0.04*	June 24 to September 3

STATION	Estimated Mean Monthly Unit Runoff ($l/s/km^2$)				Period of Record
	June	July	August	September	
H01	72.6*	33.2	22.9	6.8*	June 25 to September 5
H02	121.4*	31.9	18.9	2.4*	June 26 to September 5
H04	71.9*	20.4	27.8	11.6*	June 23 to September 4
H05	32.5*	10.5	26.2	6.3*	June 23 to September 4
H06	152.1*	54.7	30.2	7.2*	June 26 to September 4
H11	8.7*	11.0	38.2	10.6*	June 24 to September 3

Note:

1. Months with incomplete data records are indicated with an asterix.

4 Summary

The 2016 Hydrometric Monitoring Program allowed for the continued monitoring of streamflow at the AEMP hydrometric stations. The data collected confirmed the rating curves at all stations. It is recommended that future hydrometric monitoring includes more frequent site visits during the season to ensure the proper operation of data loggers and to confirm or improve rating curves, especially during summer high flow events.

5 References

Story Environmental Inc. (SEI), 2016. Memorandum to Jim Millard, Baffinland Iron Mines Corporation. Re: *2015 Hydrometric Monitoring Program*. February 2. Haileybury, Ontario. Ref. No. 199-01-09.

Prepared by: Andrew Rees, Ph.D., EP
Senior Environmental Scientist

Reviewed by: Maria Story, P.Eng.
President

Attachments:

Figure 1	H01 - Phillip's Creek Tributary Rating Curve
Figure 2	H02 - Tom River Rating Curve
Figure 3	H04 - Camp Lake Tributary (CLT-2) Rating Curve
Figure 4	H05 - Camp Lake Tributary (CLT-1) Rating Curve
Figure 5	H06 - Mary River Rating Curve
Figure 6	H11 - Sheardown Lake Tributary (SLDT-1) Rating Curve
Figure 7	H01 – Phillip's Creek Tributary 2016 Streamflow Record
Figure 8	H02 - Tom River 2016 Streamflow Record
Figure 9	H04 - Camp Lake Tributary (CLT-2) 2016 Streamflow Record
Figure 10	H05 - Camp Lake Tributary (CLT-1) 2016 Streamflow Record
Figure 11	H06 - Mary River 2016 Streamflow Record
Figure 12	H11 - Sheardown Lake Tributary (SLDT-1) 2016 Streamflow Record
Figure 13	2016 Unit Runoff and Daily Precipitation
Figure 14	H05 - Measured Streamflow Hydrographs 2006-2016

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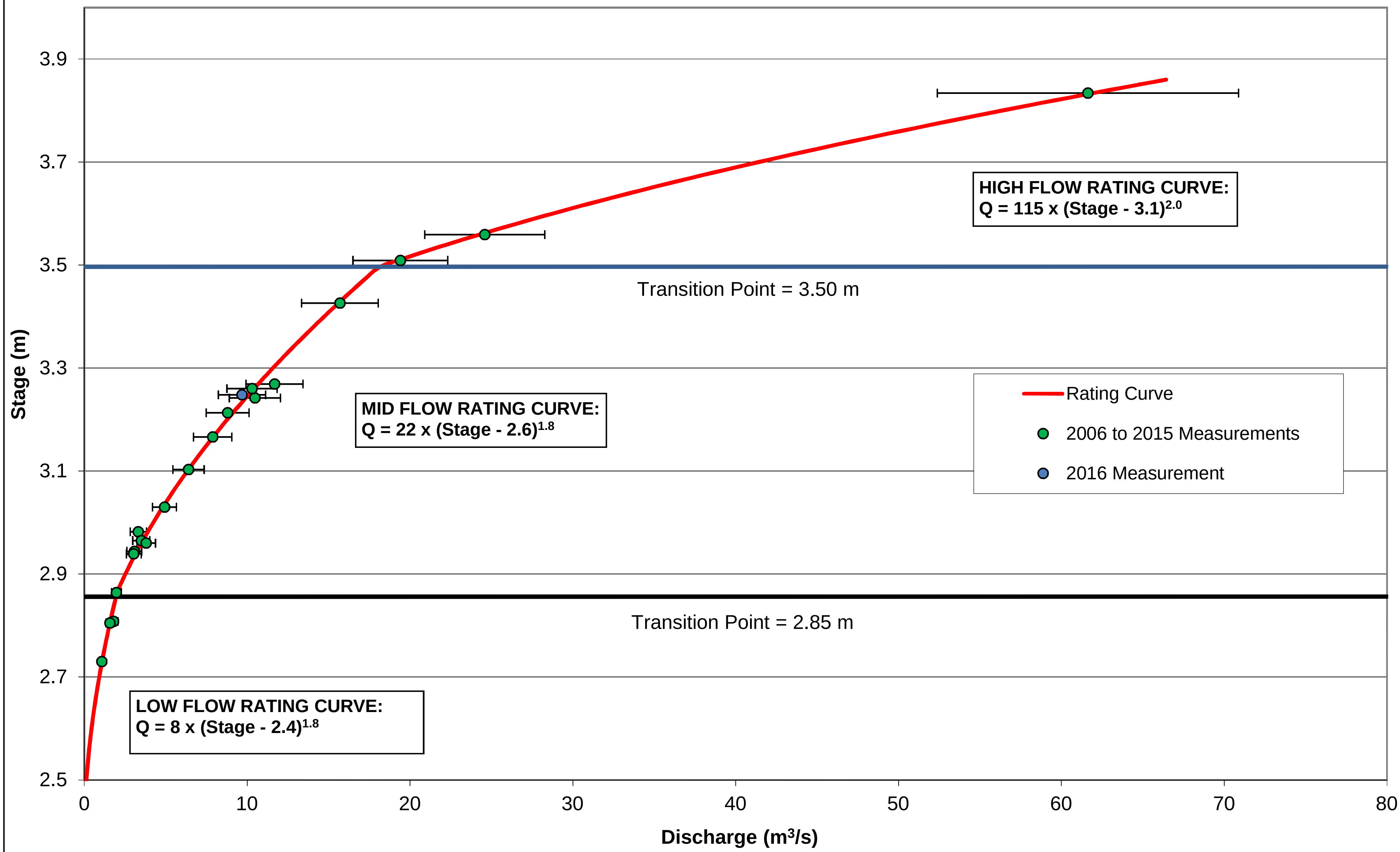
Attachments



NOTE:
1. RATING CURVE SHOWN TO MAXIMUM RECORDED STAGE.

Figure 1 **H01 - Philips Creek Tributary Rating Curve**

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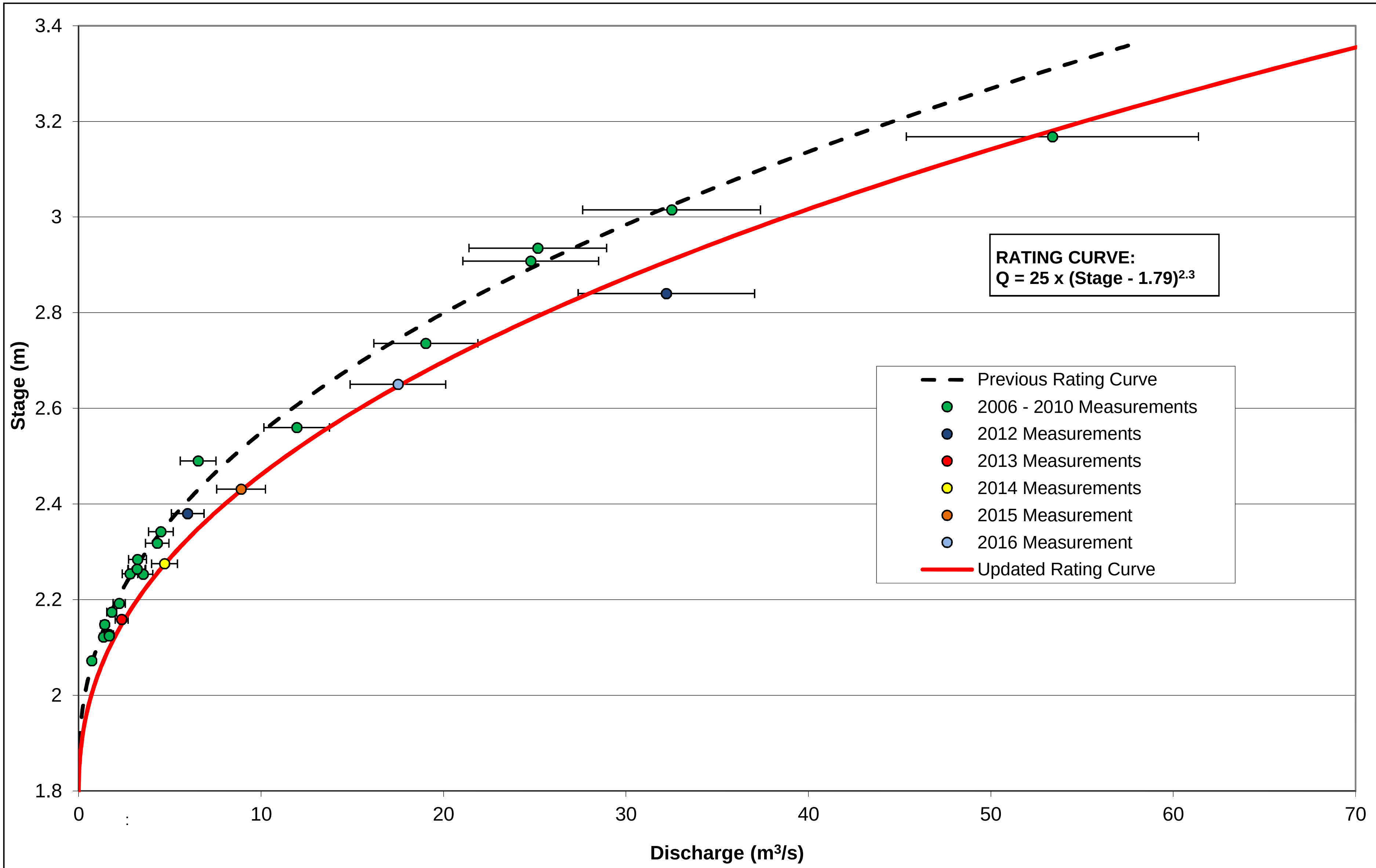
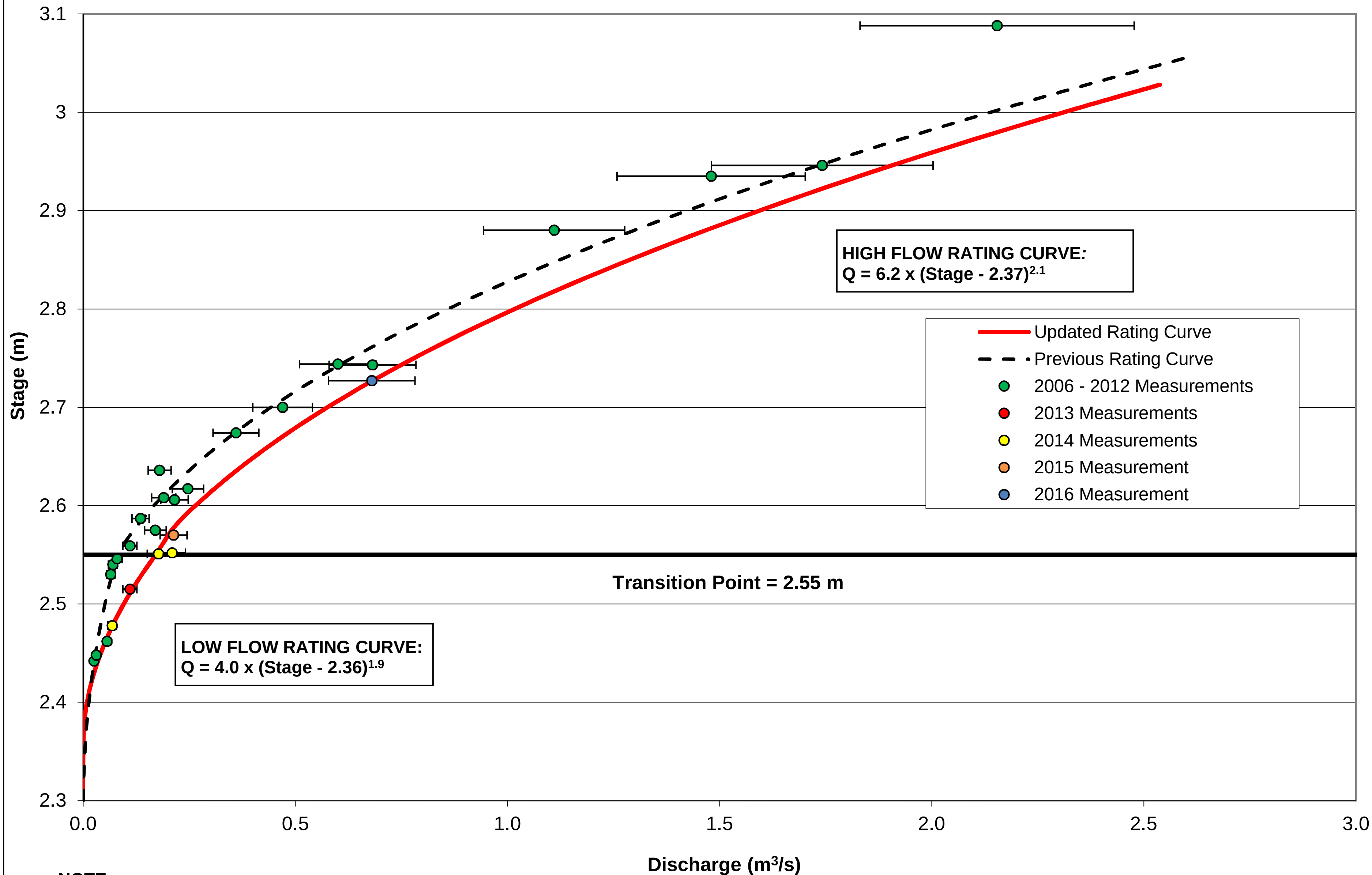


NOTE:
1. RATING CURVE SHOWN TO MAXIMUM RECORDED STAGE.

Figure 2 **H02 - Tom River Rating Curve**

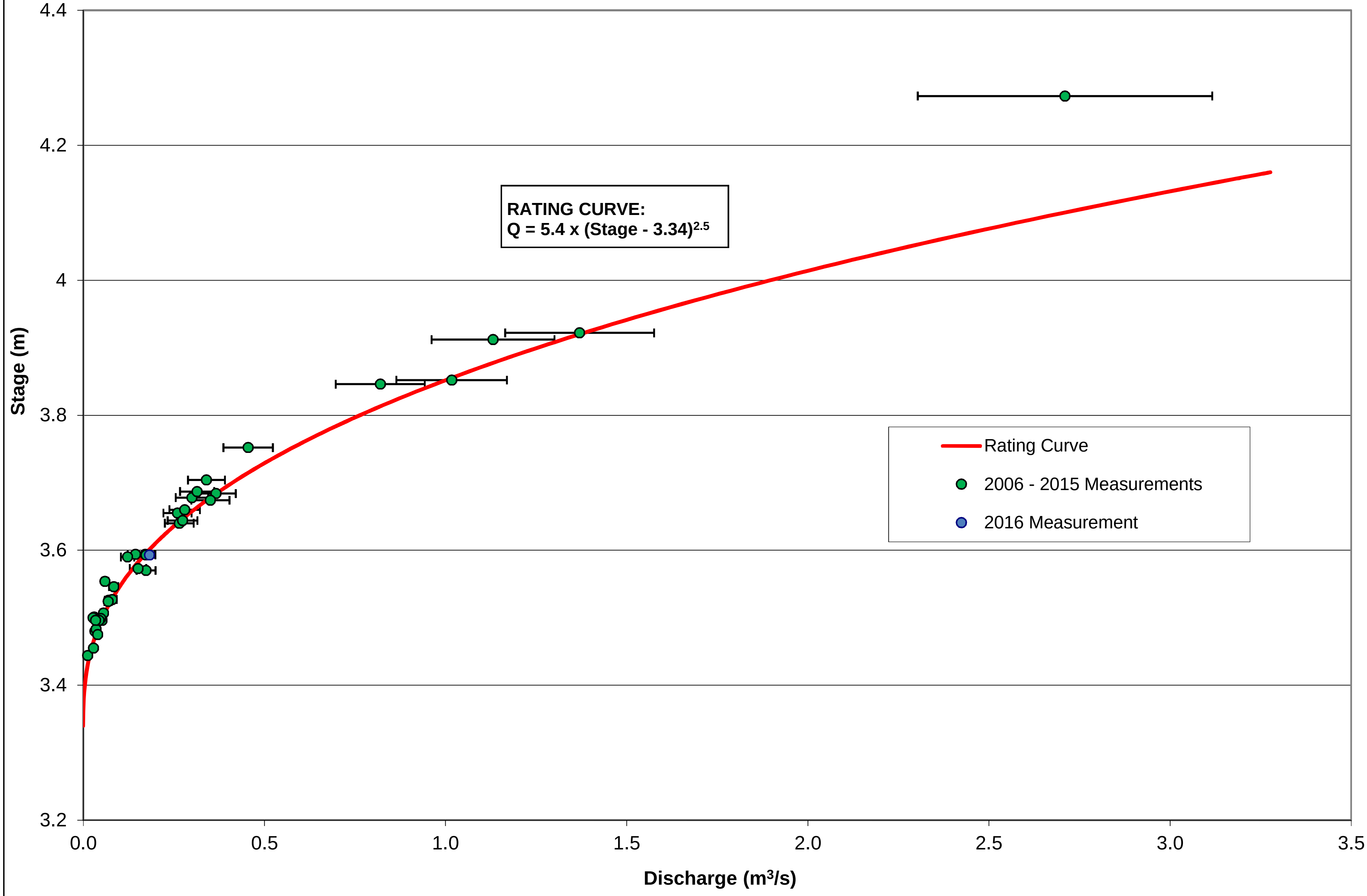
R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H02 - 2016_FINALFigure 2



NOTE:
1. RATING CURVE SHOWN TO MAXIMUM RECORDED STAGE.

Figure 3 **H04 - Camp Lake Tributary (CLT-2) Rating Curve**

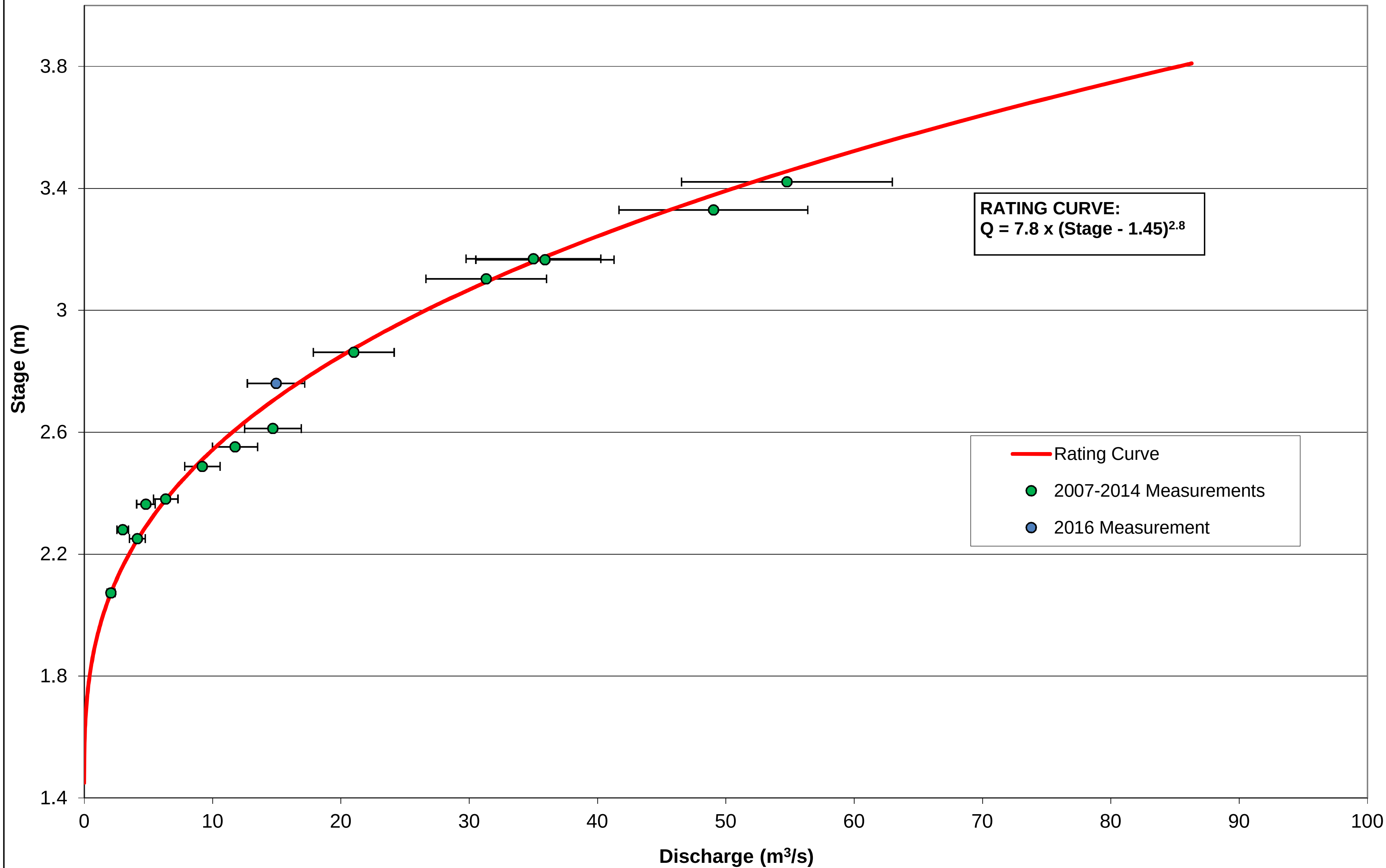
R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H4 - 2016_FINALRC



NOTE:
1. RATING CURVE SHOWN TO MAXIMUM RECORDED STAGE.

Figure 4 **H05 - Camp Lake Tributary (CLT-1) Rating Curve**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H5 - 2016_FINALRC

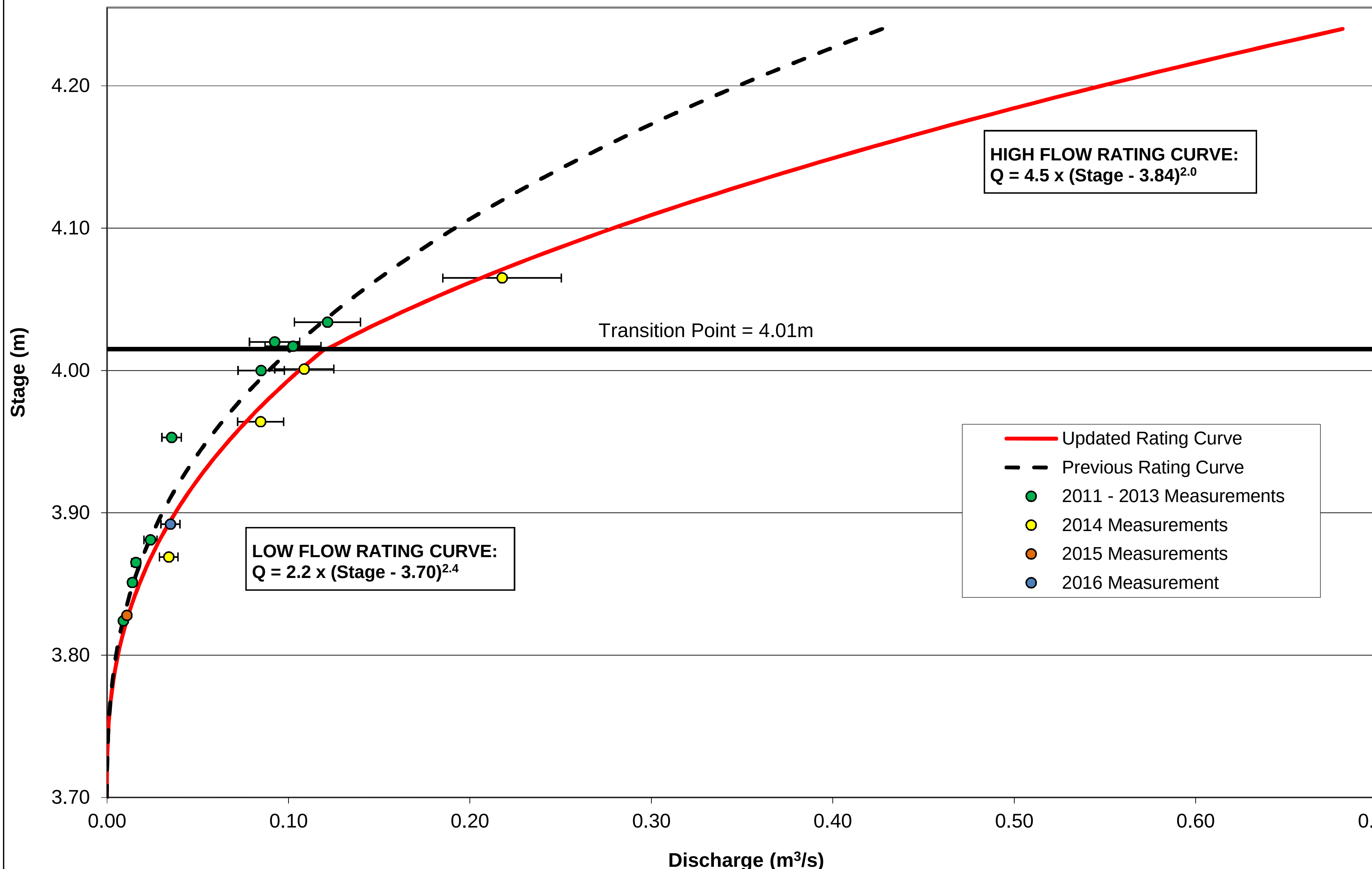


NOTES:

1. RATING CURVE SHOWN TO MAXIMUM RECORDED STAGE.

Figure 5 **H06 - Mary River Rating Curve**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H06 - 2016_FINALFigure 5



NOTE:
1. RATING CURVE SHOWN TO MAXIMUM RECORDED STAGE.

Figure 6 **H11 - Sheardown Lake Tributary (SDLT-1) Rating Curve**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H11 - 2016_FINALFigure 6

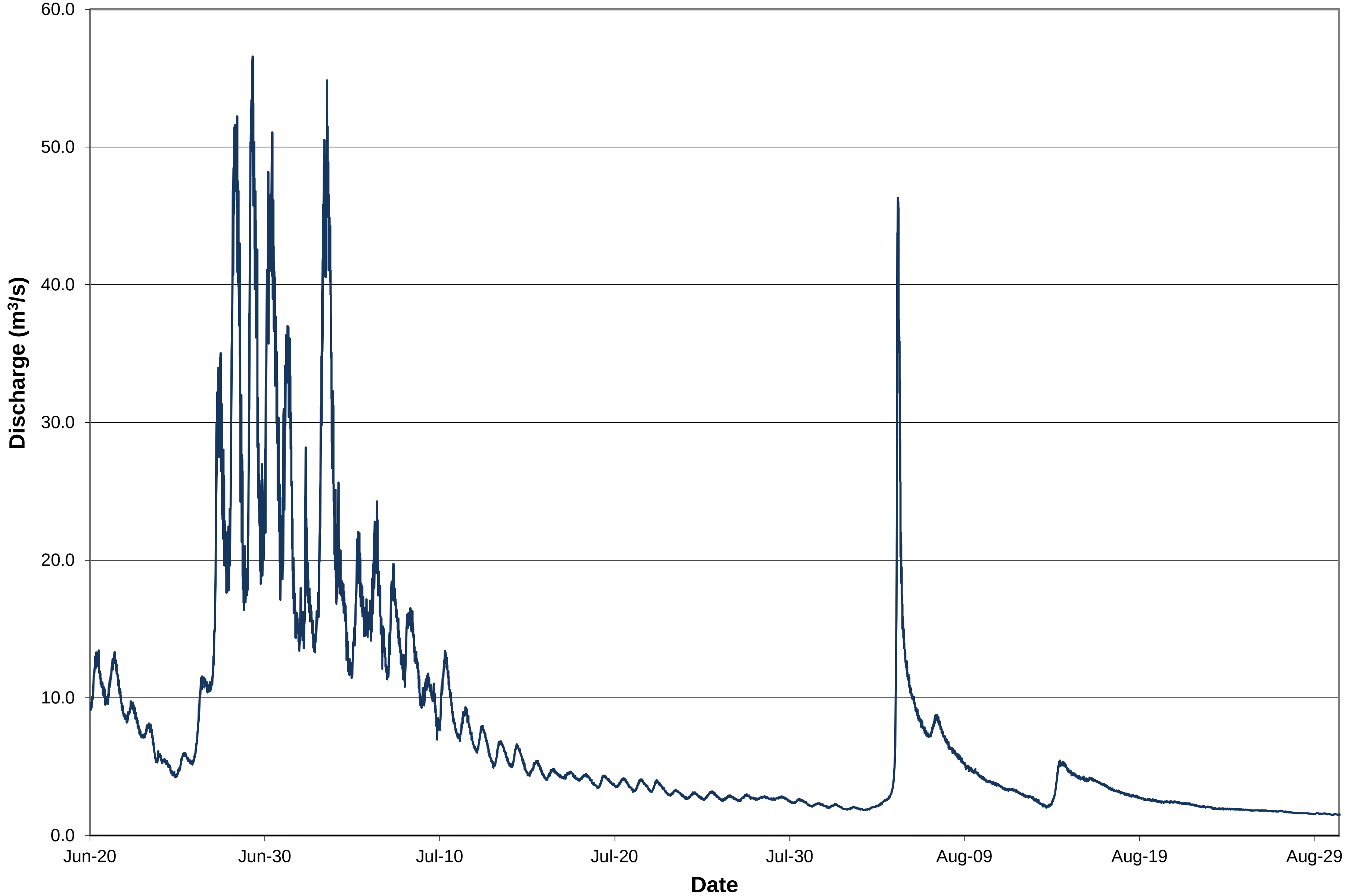


Figure 7 **H01 - Philips Creek Tributary 2016 Streamflow Record**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H01 - 2016_FINALFigure 7

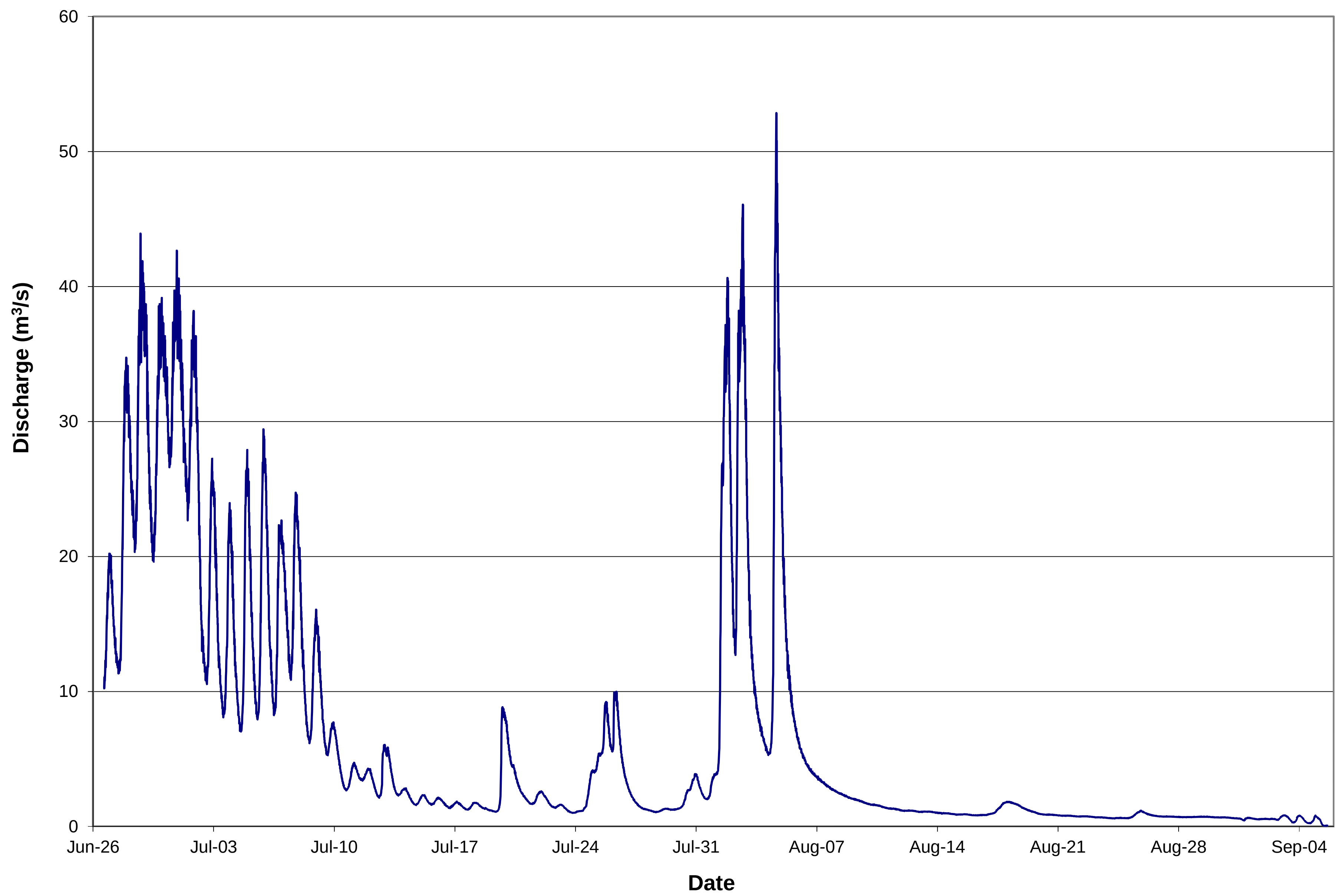


Figure 8 **H02 - Tom River 2016 Streamflow Record**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H02 - 2016_FINALFigure 8

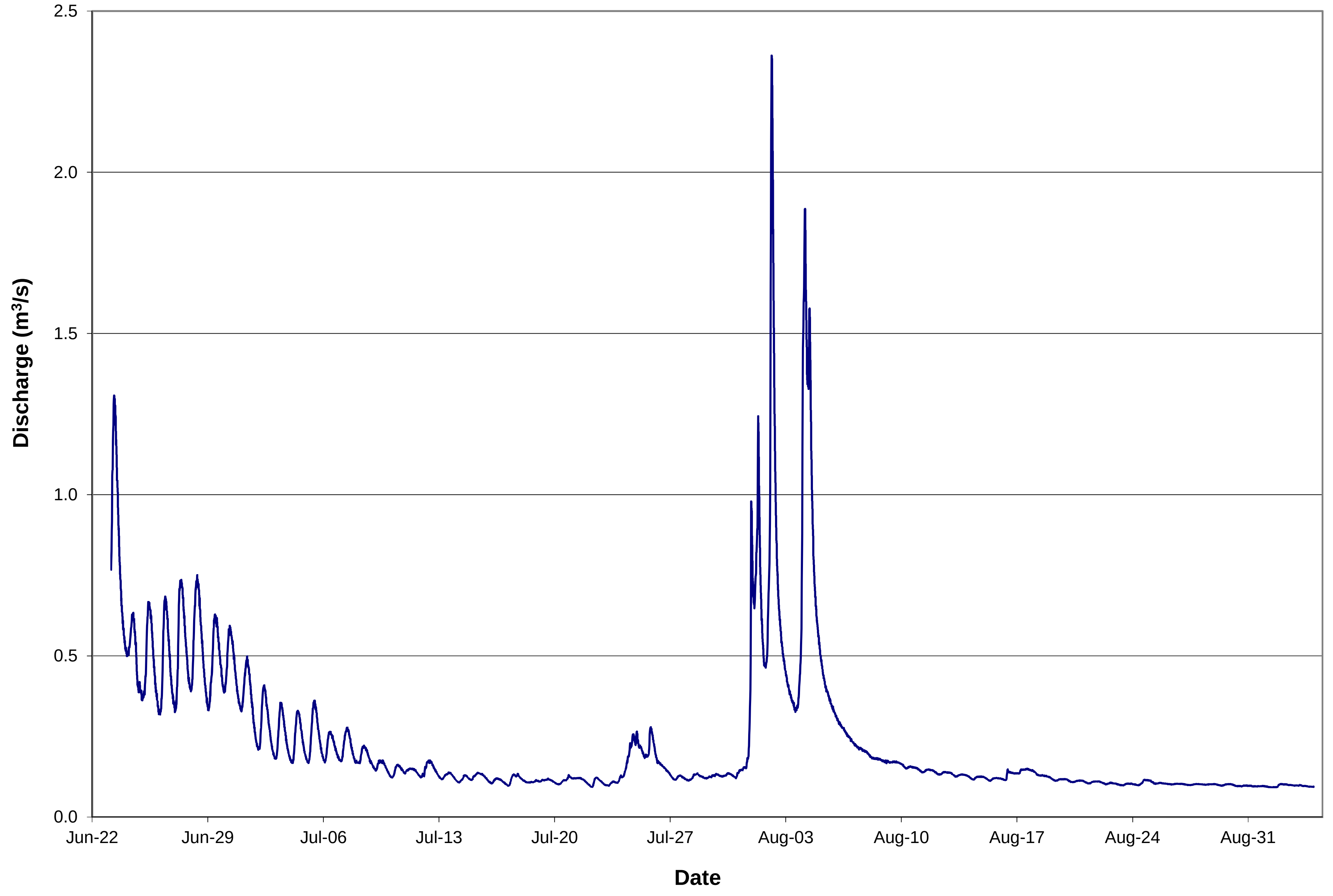


Figure 9 **H04 - Camp Lake Tributary (CLT-2) 2016 Flow Record**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H4 - 2016_FINALFLOW

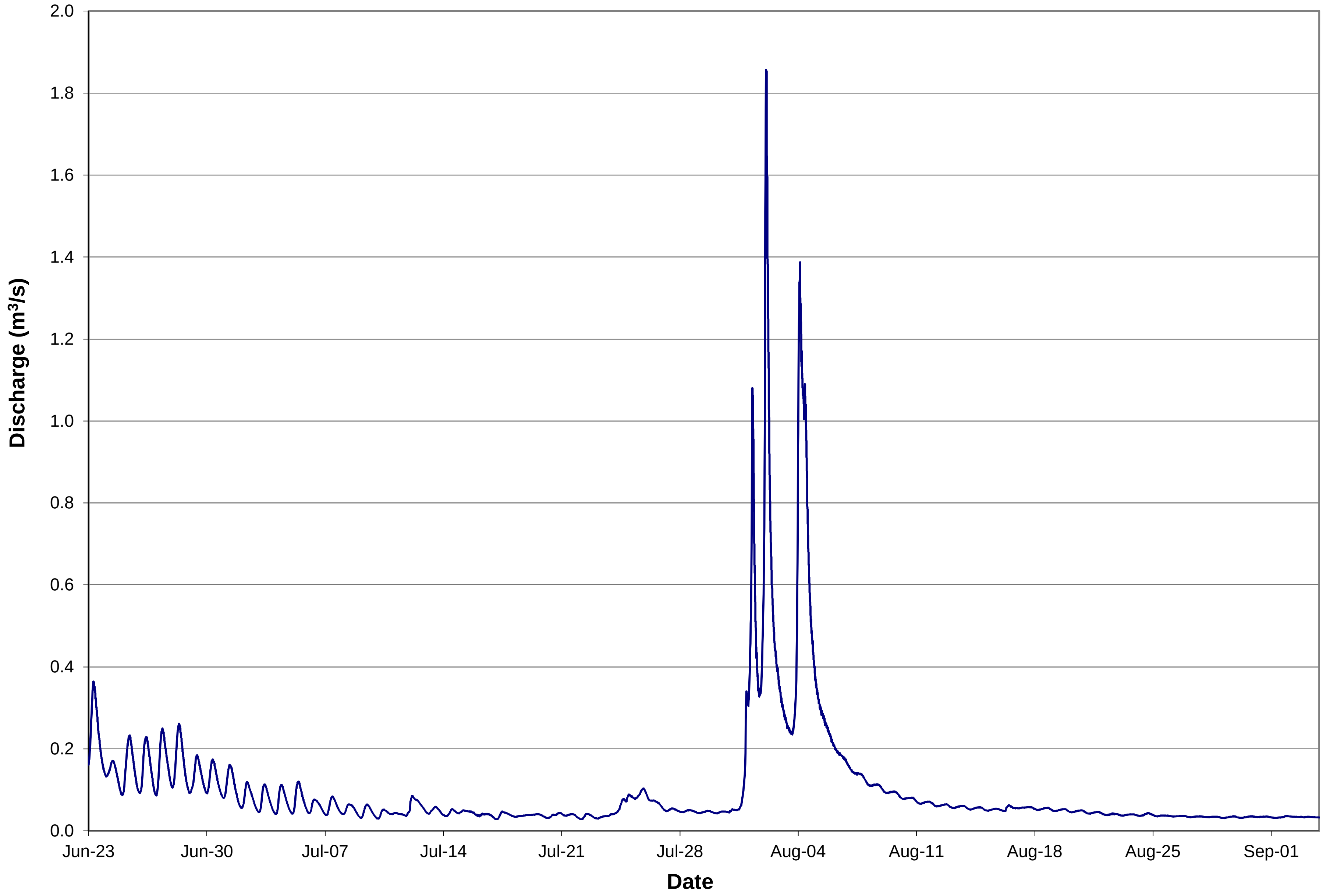


Figure 10 **H05 - Camp Lake Tributary (CLT-1) 2016 Flow Record**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H5 - 2016_FINALFLOW

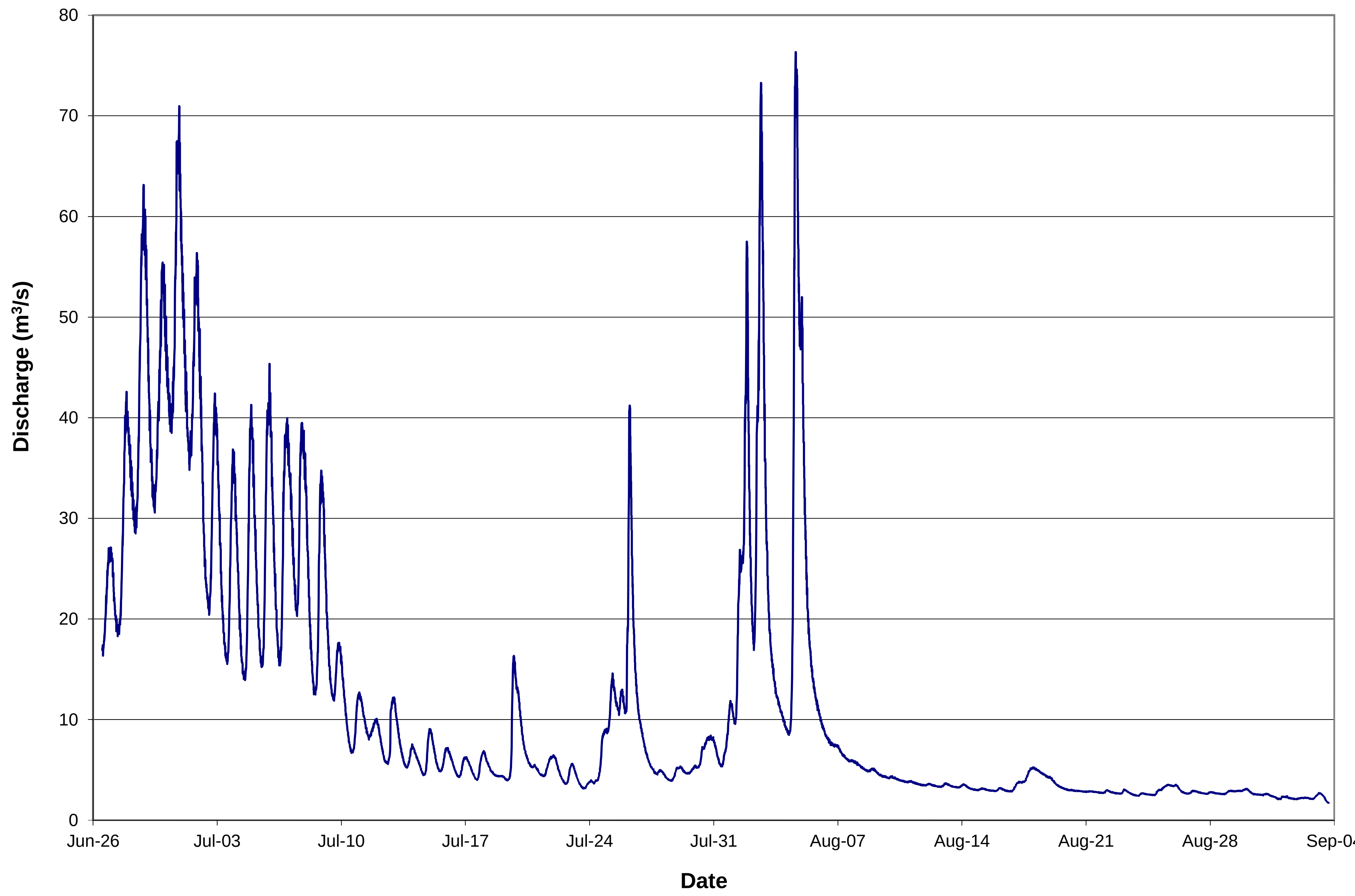


Figure 11 **H06 - Mary River 2016 Flow Record**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H06 - 2016_FINALFigure 11

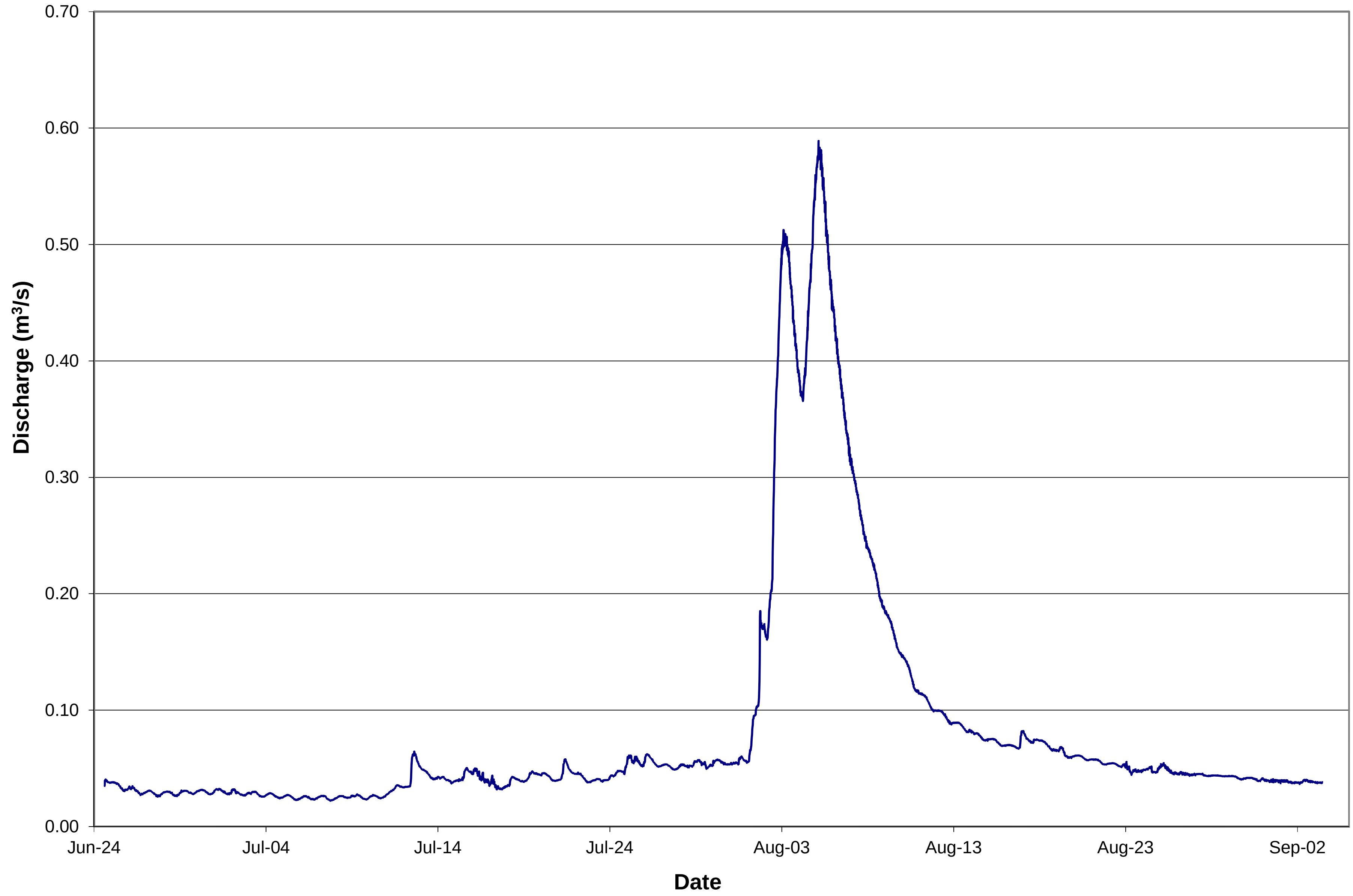


Figure 12 **H11 - Sheardown Lake Tributary (SDLT-1) 2016 Streamflow Record**

R:\SEI\199 Baffinland\03 - 2016 Hydrology\Report\2016 AEMP Hydrology Site Report\Figures and Tables\H11 - 2016_FINALFigure 12

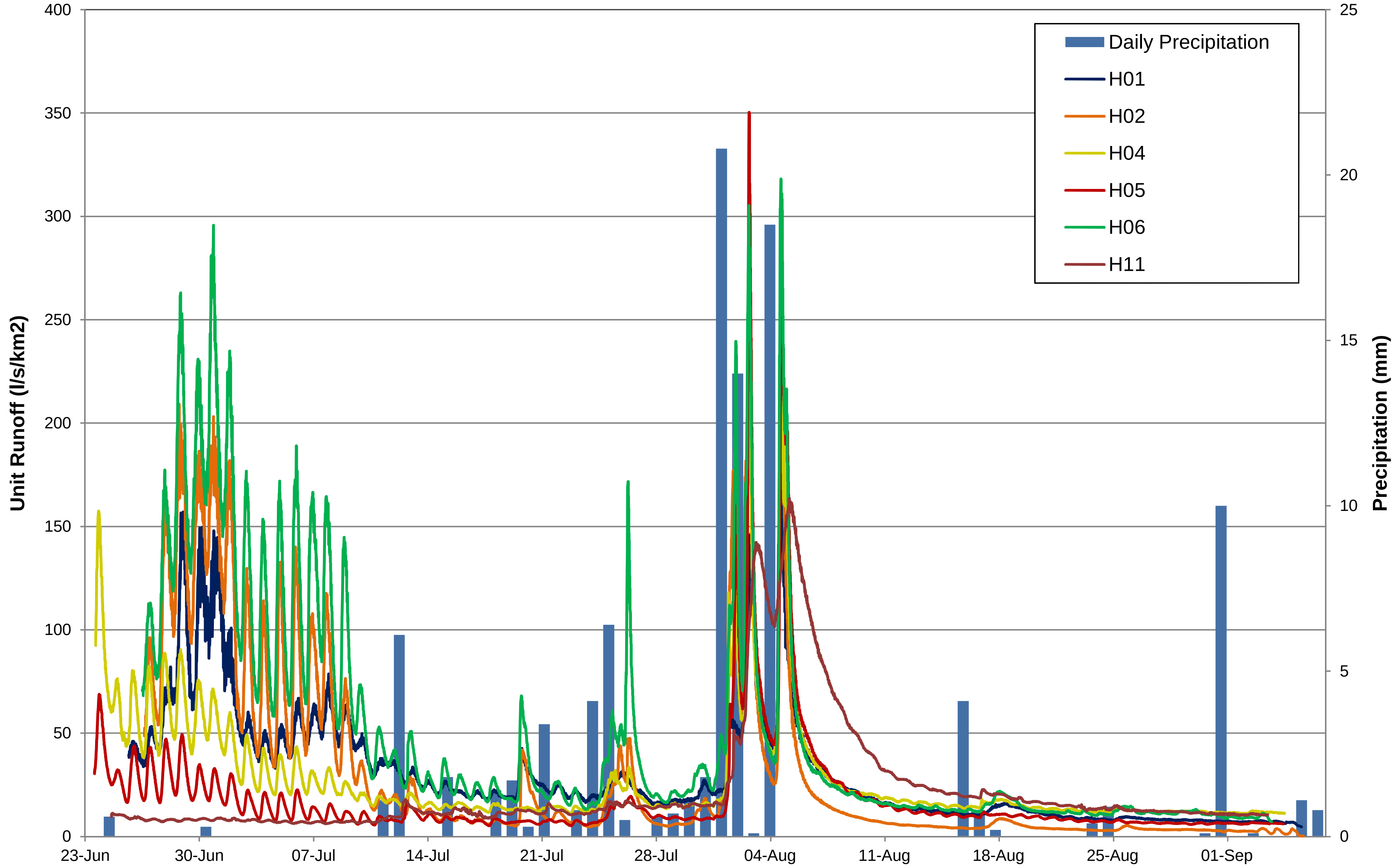


Figure 13 **2016 Unit Runoff and Daily Precipitation**

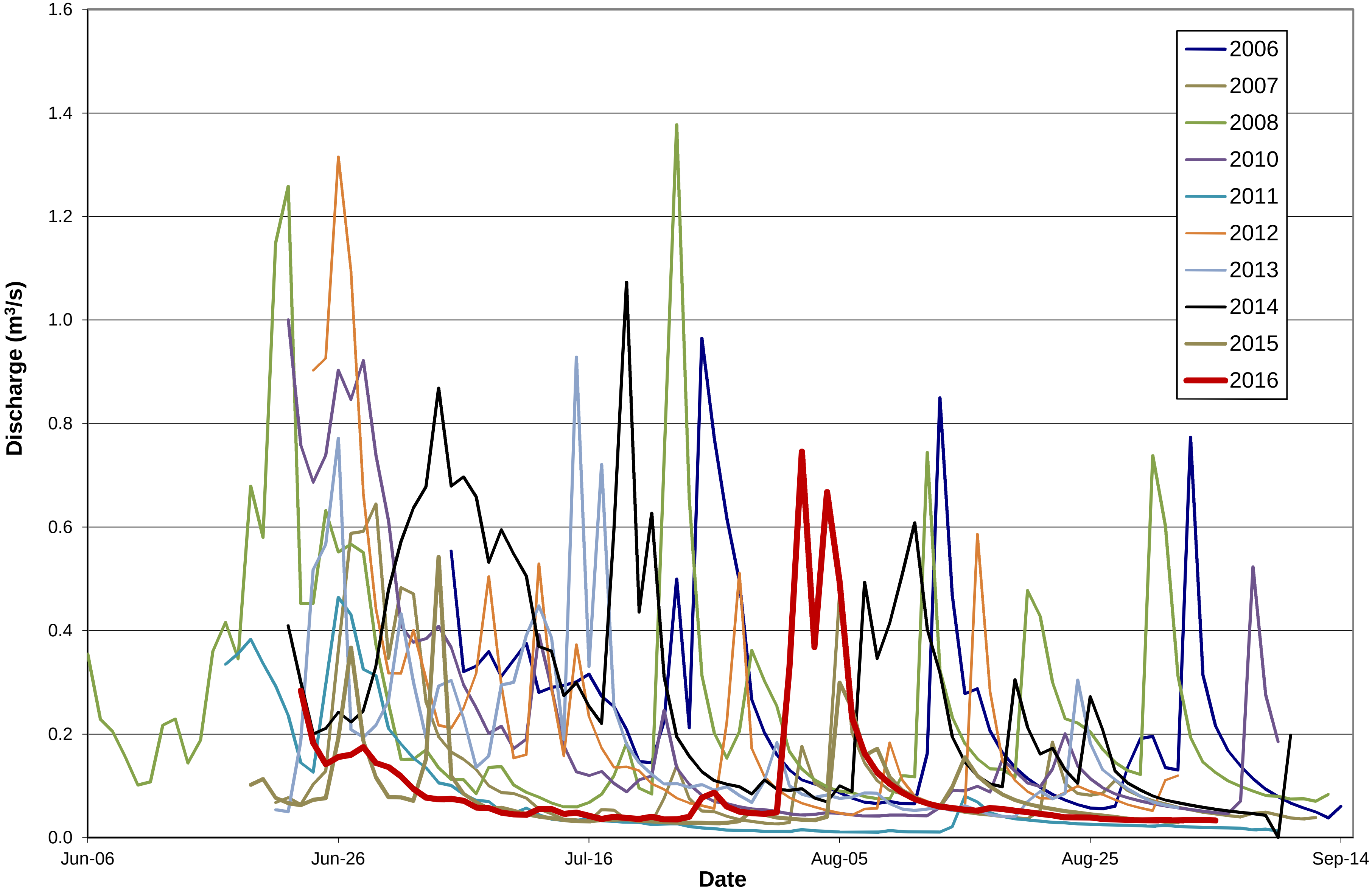


Figure 14 **H05 - Measured Streamflow Hydrographs 2006 - 2016**

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